ELECTRICAL REVIEW

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23rd July, 1948

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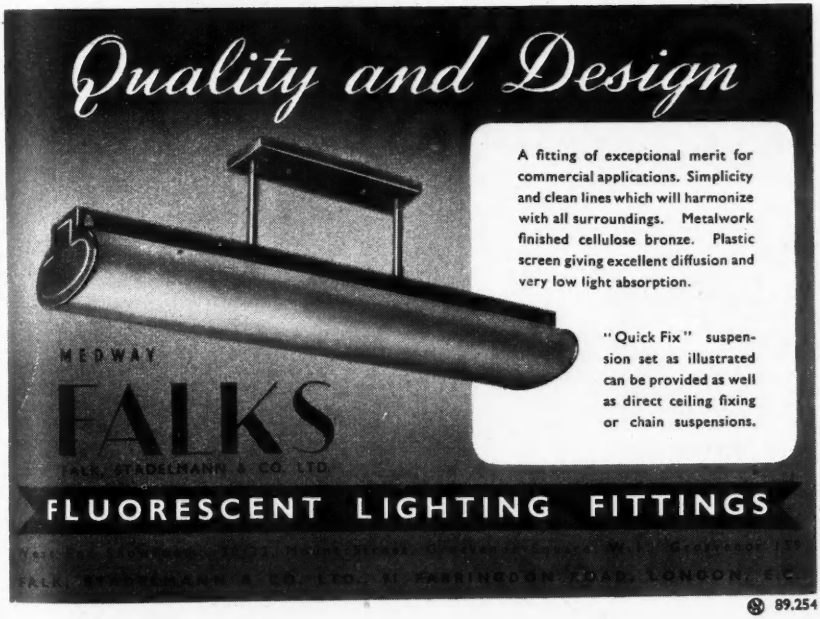
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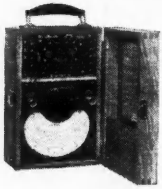

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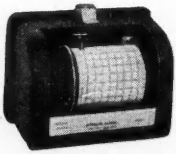

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

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Consultative Councils

Intentions and Actualities

LORD WOLVERTON, in the House of Lords debate on the Gas Bill, referred to the long delay in the appointment by the Minister of Fuel and Power of the Consultative Councils under the 1947 Electricity Act. A few days later the Secretary of State for Scotland announced the names of the members of the North Scotland Consultative Council, but still, at the time of going to press, the Councils for the fourteen other electricity areas are unknown. In his reply for the Government, Lord Hall said that the large number of names submitted to the Minister (he thought about 1,400) took "quite a little sorting out."

Representation Problem

There can be little surprise at this. Although local authority representation is to be not less than half (nor more than three-fifths) in the case of each Consultative Council there are several hundred authorities competing for positions which can number at the most only 252 (i.e., three-fifths of the maximum number of thirty for each of the fourteen Councils). Surprise is further lessened when it is remembered that the greatest possible number of seats to be allocated to other interests is 210. These interests are, to quote the Act, "agriculture, commerce, industry, labour and the general interests of consumers of electricity and other persons or organizations interested in the development of electricity in the area"—in fact everybody else, yet surely "everybody else" is represented by the local authorities.

If there have been conflicting demands for representation, how will the Councils function when they are set up? They have rather comprehensive duties as prompters, advisers and watchdogs in relation to the Electricity Boards but under the regulations made by the Minister they are not compelled to meet more often than once in three months. It is apparent therefore that it is expected that the actual day-to-day work will be performed by the "committees or individuals to be local representatives of the Council." These representatives may be given out-of-pocket expenses and travelling allowances and paid officers may be appointed.

Carried to the extreme, it would appear that a network comparable to the Electricity Boards' own organizations could be set up, so that this "sop to the public," as it was intended to be, may prove an expensive and troublesome one. It has to be remembered that the functions of the Electricity Boards are to plan and carry out an efficient and economical distribution of those supplies (i.e., bulk supplies from the British Electricity Authority) to persons in their area who require them. It is the intention of the Boards to do this ultimately through district managers who will know their areas and the needs of the people in them.

The Boards' Responsibility

The experienced men who are being appointed to these positions must not be prevented from doing their jobs efficiently and equitably by irrelevant or impossible policies thrust on them from outside. It

is incumbent upon the Electricity Boards, who, after all, are ostensibly representative bodies, to ensure that this does not happen. Although they must, of course, pay careful attention to representations, they cannot be expected to act against their better judgment or that of their "men on the spot." Responsibility must ultimately rest with the Boards and it cannot be divided if the national system is to be successful.

Engineering Wages

IT was wisely decided at last week's York conference of executives of engineering trade unions not to proceed with the strike ballot advocated by some delegates. Instead, it was resolved to ask the Minister of Labour to set up a public court of inquiry into the rejection by the employers of the Unions' demand for increased wages. Such a proceeding is not a means of settlement of a dispute of this kind but it enables the parties to state their views in public and maybe influence one another towards a compromise.

Mine Mechanization

PURELY technical measures, it is estimated, were responsible for half the increase in coal output last year. This aspect should assume even more importance when the long-term plans of the National Coal Board are implemented. In the meantime, the immediate production drive has been assisted among other things by the introduction of cutter-loaders (still rather in the development stage), the use of more belt-conveyors, and improved lighting, as recommended in the Reid Report. Home-produced supplies of belting and ball bearings were supplemented last year by imports but the Board observes that new capacity for electric motor production became available in this country at the time it was needed. Generally speaking, the shortage of supplies had to some extent been overcome by the end of the year.

Coal Prices

THE adjustments in the prices of coal reported on page 137 are of greatest importance to the electricity supply industry. Since the end of 1939 pithead flat-rate increases, unrelated to heat value, have amounted to 26s. per ton. The relatively low heat value of power station coals can be roughly represented by the reductions foreshadowed as an interim measure. The final price structure, however, should have the positive aim of encouraging the use of low-grade fuel by allowing for the increased capital charges and operation and maintenance costs entailed in the burning of such fuel. This would find an outlet for almost indisposable products of the collieries, through extended electrification, leaving more of the better classes for export.

Small Earth Leaks

CURRENT leakage to earth that might bring risk of starting a fire may not be of sufficient magnitude to trip the circuit breaker on overload. What appears to be needed is an air-break switch having core-balance protection with a low setting that would compare not too unfavourably in cost with a shunt-operated earth trip switch. Even the small current necessary to operate the latter might be too high to obviate risk in the case of a persistent earth fault, as Mr. E. Fawsett suggests in our correspondence section.

Davy-Faraday Exhibition

THE Davy-Faraday Exhibition at the Grand Palais, Paris, which is open until the end of July, naturally revives memories of the centenary celebrations in 1931 of the discovery by Faraday of the principles of electromagnetic induction. Indeed, handsome acknowledgment is made of the co-operation of the Royal Institution, the G.P.O. and the I.E.E. among others. The well-produced catalogue sets out the wide range of activities of the two men under headings which clearly indicate their specific contributions to science. In his ability to apply his genius, Faraday owed much to the sound teaching in method which he received from Davy, who himself discovered in 1813 the principle of the electric arc.

Statistical Sampling

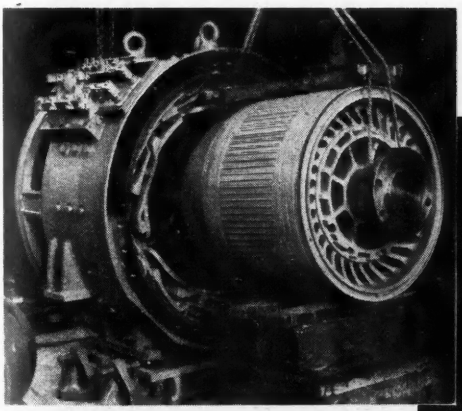
ESTIMATES of future demands have become of greater importance than ever in view of the present plant shortage. It is now nearly three years since we published particulars of an E.R.A. report by J. R. Isaacs and G. O. McLean, which applied statistical methods to the measurement of appliance saturation. This has now been followed by a further report by P. Schiller, who takes the matter a stage further and extends the method to more complex conditions.

Machinery for Overseas

Production for Export—VIII

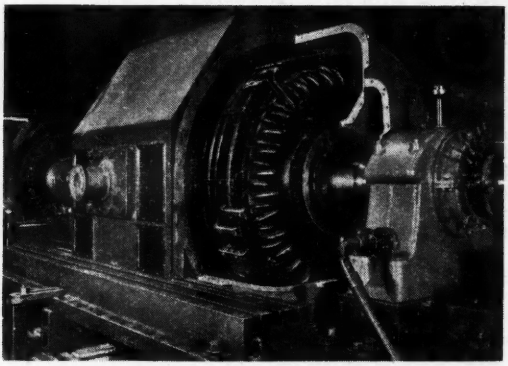
ABOUT half the present total output of electrical plant by the English Electric Co., Ltd., from its five main works at Stafford, Preston, Rugby, Bradford and Liverpool, is for export. Contracts cover complete large-scale electricity supply systems with generators driven by steam turbines, water turbines or diesel engines; the equipment for complete industrial and railway electrification schemes; turbo-electric and diesel-electric plant for marine propulsion, and many other kinds of electrical products for industrial and domestic use.

Recently we visited two of the company's works—at Bradford, where fractional-h.p. and industrial-type motors and some traction equipment are made; and Stafford, which produces large generators and motors, switchgear and transformers, winders for mines, mercury-arc rectifiers, welding equipment, meters, instruments, and industrial electronic apparatus. Comprehensive electrical equipment for special industrial applications in which highly technical processes are involved, such as steelworks, textile factories, mines and quarries, cement works, rubber mills and paper mills, is also designed and manufactured at Stafford.



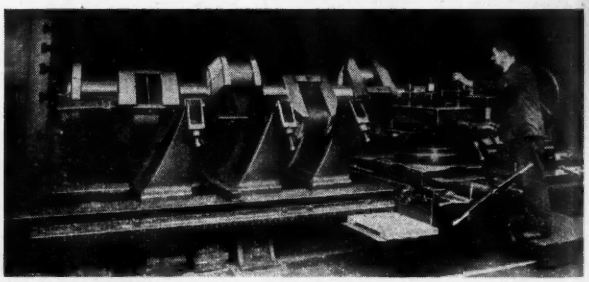
Assembling the armature of a generator for a 1,600-h.p. diesel-electric main-line locomotive for the Egyptian State Railways. Right: A 1½-h.p. loom-motor, one of 1,500 being made for India

Owing to the large number of indirect exports it is difficult to give an accurate figure for the proportion of motor production for overseas markets. It is estimated, however, that including 10 per cent direct exports, the figure approximates to the average proportion for all this company's products. Motors of all types and for all purposes are made. One particularly interesting contract in hand when we visited the works was for 1,500 $\frac{3}{4}$- and 1$\frac{1}{2}$-h.p. loom motors of exceptional compactness for use in India. Several motors required by the contractors for the Castello do Bode hydro-electric scheme in Portugal were also passing through the shops.



A 7,500-kW, 6·6-kV turbo-alternator for Paraguana, Venezuela, being dismantled for shipment after completing its tests

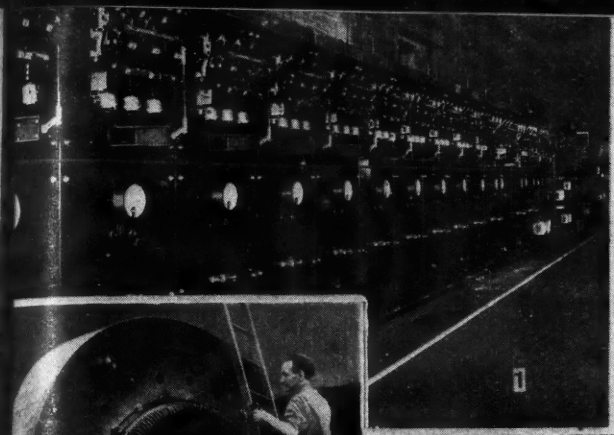
Nearly 80 per cent of the Traction Department's output is being exported. Electric railway contracts are in hand for India, Denmark, New Zealand and Brazil, while Egypt, Iraq, Ceylon, Malaya, Tasmania, Western Australia, New South Wales and Sweden have all ordered Diesel-electric plant. Trolley-bus and tramcar equipments are being made for Holland, Belgium, Portugal, Brazil, South Africa, South Australia, India and China and there are major inquiries from Argentina, Brazil, India, Portugal and South Africa.

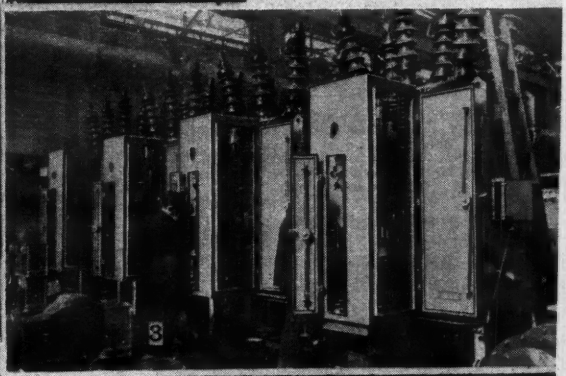


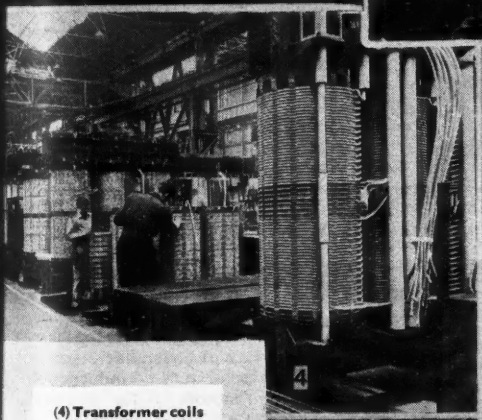
Half a crankshaft for an eight-cylinder 1,500-h.p., 375-r.p.m. turbo-pressure-charged "SL" type diesel being turned

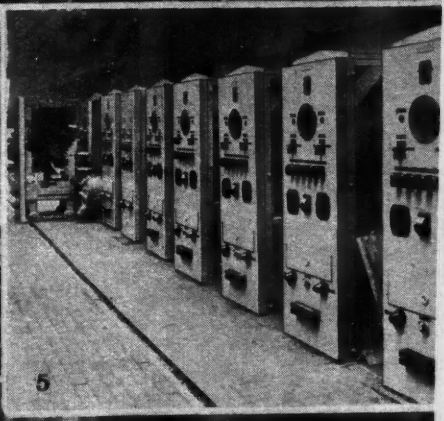
In the design of all traction equipment intended for overseas especial attention has been paid to robustness, long life, satisfactory operation under all climatic conditions and ease of assembly, installation and maintenance. Examples of the means adopted to these ends are the design of motors which for a given frame size will withstand the maximum current and therefore give the maximum power output on a low system voltage; the arrangement of the compensating windings in the pole faces of the field system so that these windings can be assembled independently; the lining of control cabinets with fireproof insulating material as a precaution against arcing; and the use of extra-light contacts with only slight rubbing action, to minimize wear and maintenance. To assist in the assembly of traction equipment on arrival at its destination extensive use is made of photographs.

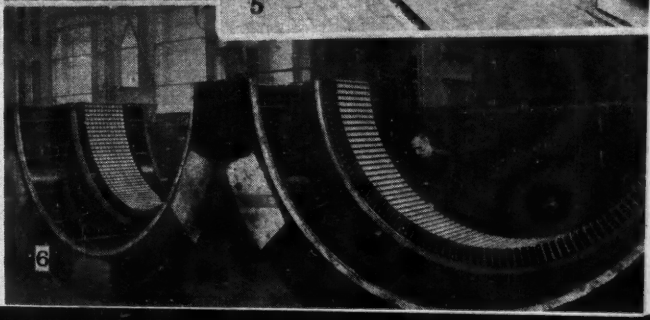
At Stafford, although we were told that production for overseas represented about one-half of the total, export orders seemed to be predominant. In the heavy machine shop, we saw one half of the crankshaft for an 8-cylinder, 1,500-h.p., 375-r.p.m., turbo-pressure-charged "SL" type diesel engine being turned in a lathe. This was part of an order for eight engines of the same type and rating for electric power generation in Palestine in connection with the manufacture of cement. Diesel engines are actually made at the company's Rugby works, but machine







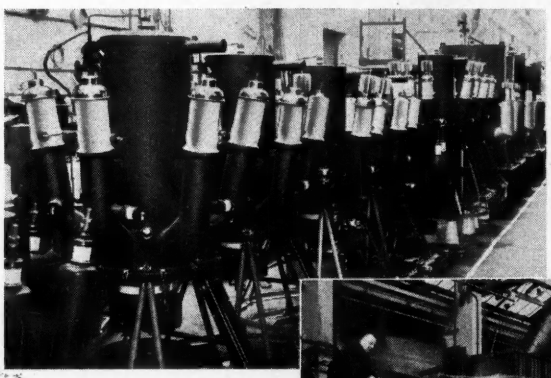


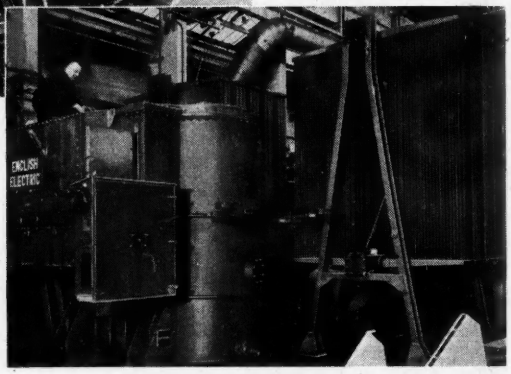


(1) A 420-V a.c. flat-back type switchboard for Bombay. (2) A stator of an 875-kVA alternator for petroleum pipe-line pumping equipment for Iraq ready for impregnation. (3) 5-kV, 500-MVA outdoor oil circuit breakers for Russia

(4) Transformer coils and windings being constructed. (5) Another consignment of switchgear for Russia: draw-out truck-type cubicles with 3·3-kV, 150-MVA air-break circuit breakers for the control of power station auxiliaries. (6) Two half stator frames and cores for a 6,000-kW, 6,300-V vertical shaft water-turbine-driven alternator for Russia

shop and other manufacturing facilities are often exchanged between the works including the prime movers, generators, switchgear and transformers. The two halves of the stator for a 6,000-kW vertical shaft water turbine driven alternator were seen with the winding operation just commencing: a similar alternator, of 8,000-kW output, was being erected for testing. Switchgear for Russia included 38·5-kV, 500-MVA outdoor oil circuit-breakers and some draw-out truck type cubicles with 3·3-kV,





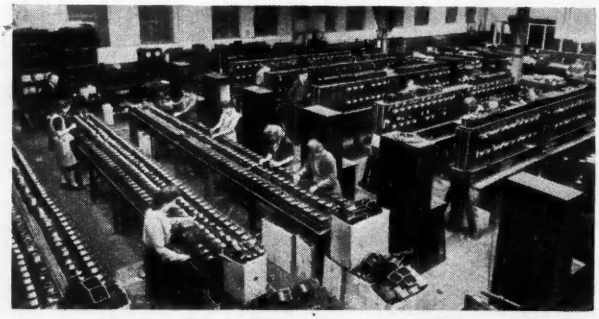
Steel bulb mercury-arc rectifiers for 600-V traction substations on the Belgian National Railways
Right: One of sixteen 12,500-kVA, 33/6·25-kV three-phase "ON" transformers for Calcutta

when increased efficiency and economy in production can thereby be achieved.

In connection with a contract for twelve petroleum pipe-line pumping equipments for Iraq we came across several pieces of equipment in various stages of construction. There was the partly-assembled salient-pole flywheel type rotor of a 1,560-kVA, 3·3-kV alternator, the stator of a similar 875-kVA alternator ready for impregnation, and two rotors being packed for shipment.

The company has a number of large contracts in hand from the U.S.S.R. for steam power station and water power station plant, 150-MVA air-break circuit-breakers for the control of power station auxiliaries.

For petroleum production at Paraguana, Venezuela, several 3,600-r.p.m. steam turbo-alternator sets were being built, with a rating of 7,500 kW, 6·6 kV, 60 cycles: to meet local requirements they have been insulated for 11 kV. One of the alternators was being dismantled for shipment after completing its tests. Other interesting orders in hand for heavy machinery included 2,000-h.p. a.c. winding motors for the Witwatersrand; synchronous induction motors for the Ariston Gold Mines, West Africa; 7,500-kW turbo-alternators for Balik Papan,



House service meters being tested

Borneo; a 3,500-kVA, 6·6-kV, synchronous motor-generator set for the Australian Iron and Steel Corporation; and additional equipment for the Waitaki hydro-electric scheme, New Zealand.

A large number of transformers was in course of manufacture for various destinations overseas and we saw tanks being welded with the company's a.c. arc welding equipment, and cores and windings being constructed. A 12,500-kVA, 33/6·25-kV three-phase "ON" transformer, one of sixteen ordered for Calcutta, was being erected. These transformers have each two banks of coolers and are low temperature rated on account of the climatic conditions on site. They are provided with electrically operated remote controlled on-load tap-changing gear.

In the Switchgear Department a metalclad compound-filled switchboard, also for Calcutta, was rated at 250 MVA at 6·6 kV. A 420-V a.c. flat-back switchboard destined for sugar mills in Bombay was equipped with 25-MVA air-break circuit breakers.

Amongst the pumpless steel-bulb mercury-arc rectifiers were units for 600-V d.c. traction substations on the Belgian National Railways and for the electrification of the São Paulo to Jundiai section of the Brazilian Railways, to operate at 3,000 V d.c. Other rectifiers nearing completion were of the grid-controlled type for supplying radio transmitters at 15,000 V d.c. in Holland and Sweden. Contracts for rectifiers were also in hand for Turkey, Eire, Spain and Portugal. An appreciable increase in the production of electricity meters for export has recently been achieved. The house-service meter demand is now almost exclusively for models with bakelite cases, but metal-cased meters are available for the markets preferring them.

The foregoing description of course covers only a fraction of the work in hand for the export market at two of the works of the English Electric Co., Ltd., which, in addition to its other three main works already mentioned, also controls D. Napier & Son, Ltd., and Marconi's Wireless Telegraph Co., Ltd., with its subsidiaries.

Coal Board's Report

Steps to Improve Quality

RETROSPECT and prospect are dealt with in considerable detail in the 250-page annual report of the National Coal Board for 1947—the first year under nationalization. The report (H.M. Stationery Office, price 4s. 6d.) records that 187 million tons of coal were mined, an improvement of 6 million tons compared with 1946. This was attributable to the increase in the number of mineworkers (from 692,000 to 718,000); reduction in absenteeism (from 16 to 12¼ per cent); and rise in output per man-shift (from 1·03 to 1·07 tons).

There was a substantial deficit on the year's working, amounting to £23·3 million, of which over £15 million represented interest on compensation stock and "interim income" to be passed on to former owners. Costs of production were 4s. 3d. per ton higher, of which wages and other benefits were responsible for 2s. 6d. In September the price of coal was raised by 4s. a ton. The deficit, it is stated, will have to be met out of the Board's resources in later years, and will not be a charge on the taxpayer.

On capital account the Board spent £19 million in 1947, with commitments totalling £36 million. Fifty-two schemes for the reconstruction of collieries and sinking new ones were approved by the end of the year (including those begun by colliery companies), the estimated cost being £22·7 million.

Improving the quality of coal is recognized as an urgent necessity. Taking the country as a whole, forty-five new coal preparation plants with a capacity of about 14 million tons a year and costing £5 million are operating, under construction, or on order, while 140 new schemes are under consideration, to deal with about 60 millions tons of raw coal annually; these will involve the Coal Board in a capital expenditure of £20-25 million. A standard plant has been designed which should enable manufacturers to increase their rate of output. When all the new plants are in operation some 70 per cent of coal will be mechanically cleaned (against 47 per cent now). As evidence that the decline in quality has been arrested, the report states that towards the end of 1947 the Central Electricity Board indicated that in the autumn the loss of capacity at power stations due to unsuitable coal fell to less than 200,000 kW, the lowest for a number of years. During 1946 the loss was as much as 380,000 kW.

Testing of representative samples of marketed grades of coal is now carried out throughout the industry, although it will be some time before a comprehensive quality control service can be provided.

In the section of the report dealing with scientific research mention is made of experiments in underground illumination, in particular fluorescent lighting the first installation of which was carried out at Chislet Colliery, in Kent. A portable photo-electric photometer was developed for this work.

Views on the News

Reflections on Current Topics

IN his review of the country's economic position the Chancellor of the Exchequer, while seeing no cause to regret the decreased home demand for electric clocks, radio sets and domestic electrical appliances, is not so happy that there is some difficulty in selling the same goods abroad. The reason for the reduced demand is the same in both cases, namely the cost. Although Sir Stafford Cripps does not consider that it is desirable to counteract the present tendency, the remedy is simple. Removal of the purchase tax would not only enable our own people to acquire goods but also, by promoting this healthy home market, bring about a reduction of production costs and so lower the price of apparatus for overseas.

* * *

To the objection that the increased sale of appliances would impose a still greater strain on generating plant it may be said that so far as clocks and radio sets at any rate are concerned this would be practically neglig ble. It is better surely that people both at home and overseas should be able to afford to buy apparatus than that neither should do so. Incidentally, I wonder how many will agree with Sir Stafford's classification of electrical appliances as non-essential ?

* * *

A question put to me recently was whether any scientific justification exists for the use of the term " r.m.s. value " when related to a purely momentary phenomenon. My own view is that it doesn't, since a time factor is surely implied. Yet one often comes across the expression in documents carrying a weight of authority that calls for precision in wording. Until an equally concise phrase can be coined, I suppose the present term will continue in being. I had to confess my own inability to suggest one.

* * *

Since the first experimental installation of fluorescent lighting in a coal mine was completed at Chislet, in Kent, last year good progress has been made and by the end of the present year a further eight experimental systems should be in operation in various coalfields. I found the B.B.C. broadcast discussion on this subject last week very absorbing. The problem of lighting the moving coal face was explained, while evidence was given of the effect of poor lighting on the health of miners. The mine-workers themselves find the new fluorescent lighting a great improvement and its application opens up a vista of better conditions resulting in fewer accidents, better health and increased production.

* * *

Though the recent British Electricity Authority fuel economy advertisement, " Plugwell irons out a problem," is not likely to provoke questions in Parliament, I am not too happy about it. The basic idea is, of course, sound enough, namely that economy in the use of electricity in the home is essential in order that our factories may not have to go short of power. But is it really necessary for schoolboys to play cricket in unpressed shirts ? In any case isn't it somewhat unusual for a lad of the age shown to take such a pride in his appearance ? Such a meritorious phenomenon should surely be encouraged. No suggestion is made of the possibility of ironing the shirt during off-peak hours.

* * *

The waste-paper chase is a new form of sport to which my attention has just been drawn. A food-manufacturing company has formed thirty-two teams each consisting of a captain and ten " players." Prizes (including free meals in the canteen) were awarded to the teams collecting the largest amounts of waste paper over a three-month course. The paper had to be obtained outside the works, for the company already has an efficient collection scheme running. Weekly charts showed the progress of the contest; the winning team turned in 3 tons 12 cwt and the total collected during the three months was nearly 17 tons.

* * *

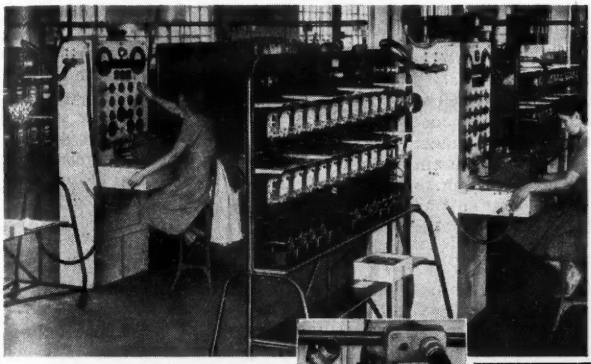
Another of those queer combinations of professions has cropped up. I believe the last one I mentioned was an electrical engineer-florist. Now I have just come across a radio and electrical engineer who is also an insurance broker. However good an engineer he may be, his policies have not kept him out of the Bankruptcy Court, though I am glad to see that he is paying 20s. in the £, plus interest.—**REFLECTOR.**

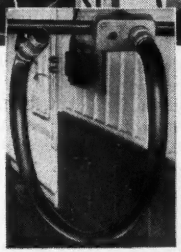
Harness Wiring

The Latest "Breeze" Applications

PRE-FORMED circuit wiring in harness-like assembly for quick construction and speedy replacement was first developed for installation in aircraft, military armoured vehicles and naval craft.

The similarly contrived "Breeze" system is now being offered by the Plessey Co., Ltd., for more general industrial employment, for instance on heavy road vehicles and in connection with rack-mounted telecommunication equipment, navigation and other instruments, while the system is well suited to many kinds of electrical test gear, especially when large numbers of interconnected items have to be frequently changed or rearranged.





Typical use of pre-formed wiring in kWh-meter testing bay at an Essex factory illustrating circuit-plugging facilities

For example, the accompanying illustrations depict the use of pre-formed wiring in the recently "laid out" testing and calibrating shop at the Plessey Co.'s works at Ilford, where, although it may not be generally known, the company does make house-service (watt-hour) meters under contract. Specially convenient is the way in which the instruments are mounted on wheeled racks to enable them to be progressed through the several stages from preliminary "soaking" to final test by simply plug-connecting the trolleys to appropriate test banks.

While "Breeze" is essentially a system of multi-pin plugs and sockets, permitting sections of pre-formed wiring to be readily assembled and removed with equal facility for maintenance or adaptation, it is not rigidly tied down to their use. When a plug-break is not really necessary circuit cabling may be taken direct from a junction box, employing simple ferrule assemblies designed for this purpose, or equally well made straight on to the terminal blocks of test gear, motors and so forth.

A feature of this system is the method of circuit coding by means of identification labels; each terminal pin, socket and connection is appropriately designated so that an entire circuit can be quickly traced for fault clearance and the avoidance of wrong connections. The whole installation can be made proof against the entry of dirt, oil, water and, where necessary, may be electrically screened to prevent radiation which might interfere with radio reception.

Two main ranges of plugs and sockets are available; the standard types primarily for low voltages and the miniature types are expressly designed for higher voltages, both usable for either d.c. or a.c. under suitable conditions. The normal rating is 5 A at 250 V, but special 500-V and 2-kV types are available while one connector to carry 19 A has been designed.

The standard housings are made of aluminium, brass, or steel. Special varieties are made to resist vibration and withstand arduous climates while there is a "fireproof" type which is capable of maintaining electrical continuity at temper-

atures up to 800 deg C for up to five minutes.

All contact pins and socket inserts are of turned brass, silver plated, while plugs are available with either fixed or loose pins held in an insulating moulding. Connections may be soldered, or crimped with the aid of a hand tool, which will accommodate interchangeable dies. There is a range of special ferrules for attaching the plugs and sockets to flexible or rigid conduit. By simply removing a " circlip " from the socket housing, the whole of the internal mouldings may be withdrawn from the shell for dismantling without any special tools.

Either portion (plug or socket) can be panel mounted or attached to a cable unit; the latter is watertight and may be straight fitting or form a right-angle outlet. Slotted keyways in both plugs and sockets prevent electrical contact before both portions are properly aligned. The mis-mating of similar types is provided against while accessories include quick-release fuse and junction boxes.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Earth-Leakage Protection

THERE appears to be a demand in certain quarters for differential current-operated type earth-leakage circuit-breakers for medium current capacities, say 30 or 60 A, especially for small factories. The contention is, as I understand it, that under certain conditions the earth-leakage current might rise to a value not great enough to trip a *voltage*-operated type, nor yet enough to blow the associated fuses, and yet cause danger from fire.

Inquiries have so far failed to elicit the name of any maker of such apparatus, and I have been told it is not an economic proposition. What is in mind is apparatus through which both phase and neutral conductors would pass and with a designed carrying capacity of 60 A should trip the circuit with an out-of-balance not greater than 3 A. I should be very glad to know if any such product is at present available.

Riding Mill, Northumberland. E. FAWSSETT.

Technical Qualifications

WHILE appreciating the outspoken words of " Chartered Electrical Engineer," I would ask if at this stage his move is a wise one. He states that membership of a professional institution is insufficient to guarantee success in this commercial world, so presumably he is raising the question of value for money, thus removing himself from the category of those who are content to pay to any association if they can only write a set of initials after their names.

I would suggest that his first step should be to examine the published accounts, item by item, of the society under consideration, making due allowance for its objects and the need for the best leadership. If he then considers the amounts expended to be too high, surely his next step is to enlist the support of fellow members, resorting to publicity only if his constitutional approach is turned down without reasonable satisfaction. Should he not wish to contribute at all to these objects, he knows his remedy.

ELECTRICAL ENGINEER.

Power Station Salaries

AS superintendent of a Class " L " station I take my stand alongside your correspondent R. H. Bent who is so righteously indignant regarding our present salaries. This unsatisfactory state of affairs is largely due to the retention of a salary schedule compiled in 1918 and now hopelessly out of date.

The salaries paid by the B.E.A., particularly to non-technical men, merely tend to emphasize how inadequately remunerated are the senior power station positions. According to B.E.A. values a purchasing officer or a personnel officer is equal to two Class " L " or three Class " F " station superintendents.

No doubt this ridiculous state of affairs will eventually be remedied, but we who have for so long carried the heavy responsibilities in the major power stations are entitled to ask that the recognition due to those holding onerous posts shall be made without any delay. CRUSADER.

E.I.B.A. Appeal

HAVING been installed president for the ensuing year at the recent annual general meeting of the Electrical Industries Benevolent Association, my mind goes back to the inaugural meeting held in 1904 and

confirmed in 1905, when it was decided to found the "Electrical Trades Benevolent Institution," as it was then called.

In the intervening years I have watched the increasing calls which the electrical industries have made on the services of that Association; in the last ten years its work has quadrupled. At the last annual meeting, held at the beginning of this month, I heard that for the first time in its history the Association had experienced a deficit on the year's accounts, and this in spite of the fact that its income had gone up by £4,300.

The main cause of this situation is the fact that the wave of tuberculosis which is sweeping this country has overwhelmed the public services which ordinarily provide sanatorium treatment. The usual waiting period before accommodation can be obtained is now twelve months, by which time urgent cases lose all possible chance of recovery. The alternative is to provide for treatment in private institutions, which is expensive. The E.I.B.A. has been generously and humanely adopting this alternative on behalf of the non-manual workers in the electrical industries with a view to extending to such sufferers every possible chance of getting well again.

This year, *unless* the electrical and radio industries realize the seriousness of the position and provide substantially increased funds promptly, the Association will have a deficit of £8,000 or more. The E.I.B.A. is doing its part, and I do ask that all staff people will realize that it is up to them to do their share to provide the necessary money.

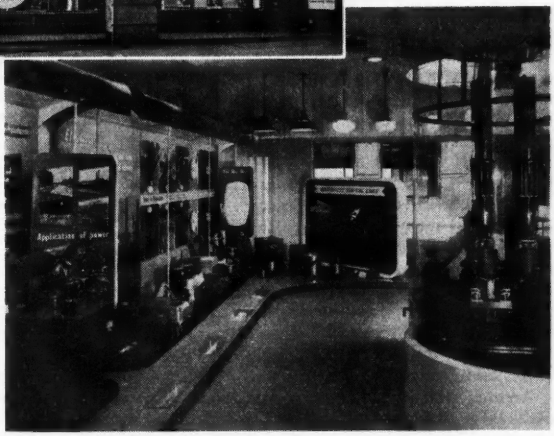
If we are to continue our tradition of relieving every genuine case of necessity our annual income must be largely increased. May I therefore make a strong personal appeal to all concerned in the electrical and radio industries to become regular annual subscribers to the funds. If this is done, the humanitarian work of the E.I.B.A. will go on from strength to strength.

*London, W.*1. A. G. BEAVER,
President,
Electrical Industries Benevolent Association.

Electricity Service Centre

London Board's New Premises

A NEW electricity service centre is being opened to-day by the London Electricity Board at 3-4, Queen Street, E.C.4. The opening ceremony is being performed by the Lord Mayor of London, Sir Frederick Wells. Lord Citrine (chairman of the British Electricity Authority), Mr. J. Hacking and Sir Henry Self (deputy chairmen, B.E.A.) are expected to be present. The picture on the right shows a section devoted to distribution, industry and heavy switchgear.



Artificial Three-Phase Systems

Derivation from Single-Phase Networks by Static Methods

By A. J. Baggott, A.M.I.E.E., and N. F. Lowry

SHORTAGE of materials has produced many specialized problems, among them the acquisition of single-phase motors and ancillary control gear for which delivery is quoted in years. As many areas have single-phase distribution networks, in whole or part, the protracted delivery of single-phase equipment seriously interferes with the present industrial drive, a problem with which the authors have repeatedly to contend.

There are available various methods of running three-phase motors from a single-phase supply, both rotary and static. The simple Ferraris-Arno system (Fig. 1) consists essentially of a three-phase induction motor running from a single-phase supply and feeding normal three-phase equipment from its terminals. Phase-splitting methods are adopted for starting and these may be dispensed with, wholly or in part, when the motor is up to speed. The pilot motor usually idles but may with advantage be given work to do, or alternatively, where intermittent starting of the load motors is not required, it can be shut down.

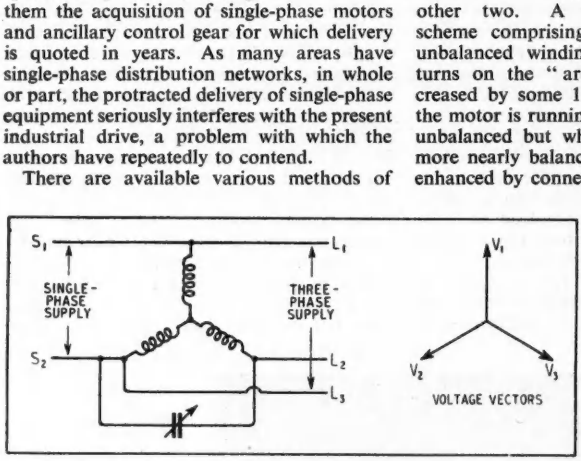


Fig. 1.—Connections for simple Ferraris-Arno system—S_1, S_2: single-phase supply. L_1, L_2, L_3: derived three-phase supply

Installations comprising many motors usually lend themselves well to this method, but justification cannot be found for it for single drives owing to the high capital cost. The danger of overload due to unforeseen plant expansion and limitations in providing adequate balanced currents for starting the load motors are disadvantages of the system on general grounds.

An induction motor with balanced windings used as a phase convertor provides a three-phase supply, the load voltage of the "artificial" phase being lower than that of the other two. A modified Ferraris-Arno scheme comprising special machines with unbalanced windings is manufactured, the turns on the "artificial" phase being increased by some 15 to 20 per cent. When the motor is running on no load, voltages are unbalanced but when it is loaded they are more nearly balanced. Performance can be enhanced by connecting a capacitor between the "artificial"-phase terminal and one of the single-phase line terminals.

A satisfactory three-phase supply can also be obtained from one of the static systems produced by several manufacturers, which consist of a series of capacitors and chokes, but the capital cost is relatively high and delivery is also protracted.

The capacitance method to be described does not suffer from these disadvantages. It is essentially a method whereby each three-phase machine is individually supplied and run from a single-phase system by the introduction of capacitors between one live-phase terminal and the terminal of the unsupplied phase of the three-phase motor. The two live leads of the single-phase supply (Fig. 2) are connected to two of the three-phase terminals and a capacitor is connected between one of

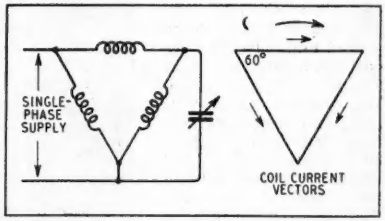


Fig. 2.—Circuit for capacitance system

these terminals and the terminal of the unsupplied winding. Phase displacements of 120 deg normal to true three-phase systems are not obtained, but under balanced conditions they become 60 deg (Fig. 3); because of this, the starting torque of an induction motor in a capacitance scheme is reduced. Hence boosting of phase angle and coil currents is necessary to obtain the minimum torque required for starting. The relationships between coil currents and capacitance and between phase angle and capacitance for a 5-h.p. induction motor running at half load are shown in Figs. 4 and 5. As is common with other artificial three-phase systems, the efficiency of the capacitance system is less than that obtained with a normal three-phase supply (Fig. 6). The power factor of the system is near unity.

In the practical application of the system the first consideration is the

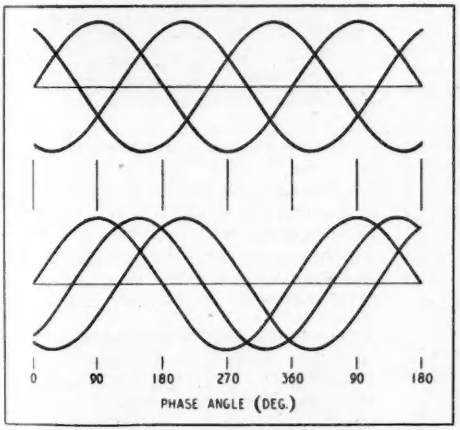


Fig. 3.—Wave forms with displacements of 120 and 60 deg

starting of the motor. The capacitance required for starting is normally higher than that required for running, hence a triple-pole change-over switch is required in addition to the normal starting equipment. Further, it is advantageous where possible to start the machine on light load to limit the initial current.

As the data concerning the motor and the drive (motional inductance, friction, inertia,

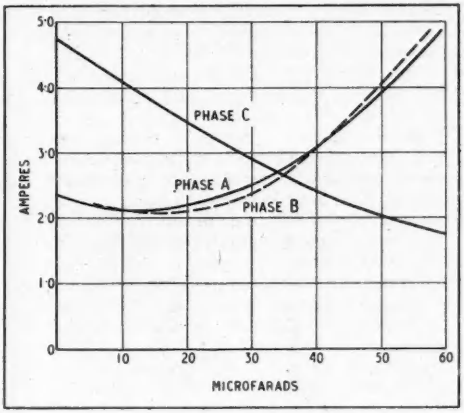


Fig. 4.—Relations of coil currents of phases A, B and unsupplied phase C to capacitance for 5-h.p. induction motor half-loaded

etc.), is unknown, the capacitance required for starting or running cannot be predetermined and has to be obtained experimentally.

The starting conditions aimed at usually require large out-of-balance coil currents, commensurate with the current limitations of the coils, while for running, balanced conditions are desirable. It is convenient, therefore, to cover both requirements by having a variable capacitance source, which also enables load curves to be produced conveniently and quickly. A bank of capacitors for tests of this kind should be mounted and switched

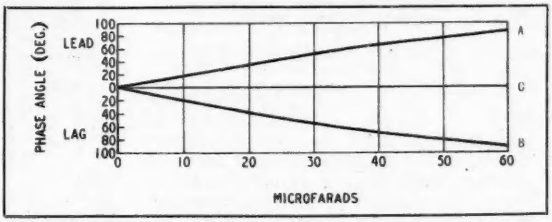


Fig. 5.—Relation of capacitance to phase angle of the coil currents in phases A, B and C for a 5-h.p. induction motor half-loaded

so that any value of capacitance from, say, 1 to 200 μF is obtainable. For measurements of current a multi-range " clip on " ammeter will be found most suitable.

Because of a large amount of work in hand the authors have found it convenient to build a special test set designed so that the required capacitance can be selected rapidly. The set consists essentially of three ammeters for load current measurement and a variable capacitor.

The method of arriving at the correct capacitance for running is as follows:—Run the motor at its normal load, introduce capacitors in sequence into the circuit and take coil-current readings for each value of capacitance. Care should be taken that the current in any one phase does not exceed the safe value for that winding. When sufficient readings have been taken and plotted the optimum capacitance will be seen (Fig. 4). At this value the coil currents should be symmetrical. With delta-connected machines line currents may be more readily measurable than coil currents and will indicate similar optimum conditions.

The typical installation shown in Fig. 7 relates to a vertical miller driven by a 10-h.p. three-phase motor, started by an " Auto-Memota " star-delta starter. The triple-pole change-over switch is fitted immediately

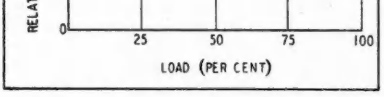


Fig. 6.—Efficiency of artificial compared with normal three-phase system

above the starter and the capacitors high above the machine.

To obtain maximum efficiency good instrumentation is essential. Great care must be taken when carrying out tests to determine the required capacitance to avoid the heavy currents which arise from grossly out-of-balance conditions. By means of a cathode-ray oscillograph the correct capacitance can be selected rapidly. A means of protection must be inserted in the capacitance phase and the capacitors must be shunted by resistors. Where solenoid-operated starting gear is used the solenoid-coil connectors should be taken to the single-phase line terminals.

The system described is giving good service,

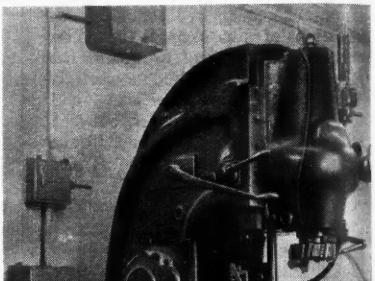


Fig. 7.—Vertical milling machine driven by 10-h.p. three-phase motor supplied from a single-phase system

particularly where individual motors are rated at less than 10 h.p., and it makes the running of three-phase motors from a single-phase supply with normal control gear a practicable and economical proposition.

Acknowledgments are due to Mr. W. G. Trend, A.M.I.E.E., former borough electrical engineer, Bromley, for permission to publish the article, and to the Exel Mould & Tool Co., Bromley, for permission to reproduce the photograph of the vertical miller.

Bibliography.

" Single-Phase to Three-Phase Conversion." A. H. Moggs, B.SC., Part 2, *I.E.E. Journal*, April, 1946.

Management Publications

THE British Institute of Management states that by arrangement with the British Standards Institution it has taken over the sale of the " Office Aid to Factory " series of publications, Parts 1-5 and 8-10, prices of which can be obtained on application to the Director, British Institute of Management, 17, Hill Street, W.1.

PERSONAL and SOCIAL

News of Men and Women of the Industry

AMONG the members of the engineering mission appointed by the Board of Trade to visit Canada are the following:—

Mr. E. H. Gilpin, director of Baker Perkins, Ltd., **Mr. E. B. Ball,** director of Glenfield & Kennedy, Ltd.; **Mr. A. W. Berry,** director of the British Engineering Association; **Mr. D. M. Buist,** director of the British Electrical and Allied Manufacturers' Association; **Mr. F. C. Fitzpatrick,** A.E.U.; and **Mr. A. G. Grant,** director of Whessoe, Ltd.

Mr. T. J. Ballard

Mr. W. E. Miller, B.A.(CANTAB.), Editor of *The Wireless and Electrical Trader* and author of books on radio subjects, has been nominated as a vice-president of the British Institution of Radio Engineers.

Mr. Everett S. Lee, chief engineer of the general engineering and consulting laboratory of the American General Electric Co., Schenectady, has been elected president of the American Institute of Electrical Engineers.

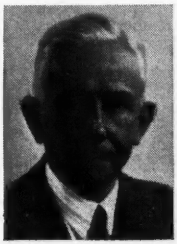
Mr. M. P. Henzell, ASSOCIATE I.E.E., A.I.MECH.E., has been appointed station superintendent at the Portobello power station of the British Electricity Authority (South East Scotland Division). He had previously served with the Mid-Cumberland Electricity Co., Yorkshire Electric Power Co. and the Scottish Central Electric Power Co., and since 1st April had been superintendent of the Bonnybridge and Falkirk stations. **Mr. J. L. Blue,** A.M.I.E.E., succeeds Mr. Henzell as superintendent at Bonnybridge. After serving with the Greenock and Glasgow undertakings he joined the staff at the Bonnybridge station of the Scottish Central Co. in 1944 and became assistant station superintendent in 1946.

Mr. M. P. Henzell

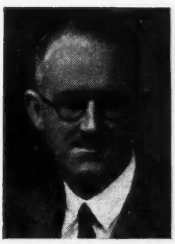
Mr. J. L. Blue

Mr. T. J. Ballard has relinquished the duties of manager of the Glasgow office of the Metropolitan-Vickers Electrical Co., Ltd., and has been succeeded by **Mr. L. Whitham.** At the Belfast sub-office, **Mr. S. McCracken,** A.M.I.E.E., has been appointed assistant manager.

Mr. Ballard joined the erection staff of the British Westinghouse Co. (later Metropolitan-Vickers) in 1904 and was subsequently in charge of work on the Clyde Valley system. He returned to the company in 1918 after a period with the British Columbia Electric Railway Co., and opened a sub-office at Dundee. In 1927 he moved to the Glasgow office to take charge of work on the change of frequency in the Corporation and Clyde Valley areas, and in 1936 he succeeded Mr. MacArthur as manager.



Mr. L. Whitham



Mr. S. McCracken

Mr. Whitham started with the company at Trafford Park in 1920 and went to the Glasgow office in 1922, acting first as technical correspondent and afterwards as sales engineer for meter and later, general plant. He then took charge of the sub-office at Edinburgh, returning in 1932 to Glasgow, where he became assistant manager in 1946.

Mr. McCracken began with the company as an apprentice in 1915, and gained an M.-V. scholarship to the Manchester College of Technology. From 1925 he was engaged on the company's erection work abroad. Mr. McCracken is on the Committee of the I.E.E. Northern Ireland Centre.

Mr. Abel Gray, formerly transmission engineer with the Central Electricity Board, Newcastle-on-Tyne, has retired and has received a presentation from his colleagues. Mr. D. Maxwell Buist, of the British Electrical and Allied Manufacturers' Association, who at one time was head of the C.E.B. at Newcastle, presided.

Mr. E. C. Green is joining Thorn Electrical Industries, Ltd., on 3rd August, as manager of the Mary Ann Domestic Appliance Division. Before the war he was with H.M.V. on domestic appliance sales and for the past four years has

been wholesale manager of that division of E.M.I., Ltd. During the war he was in charge of the Manchester branch (Lighting Division) of E. K. Cole, Ltd.

Mr. T. E. Goldup, M.I.E.E. (director), and **Mr. A. W. Welton** (financial controller) have both recently celebrated the silver jubilee of their association with Mullard Electronic Products, Ltd.

Mr. V. N. Davis, on a year's leave from Franco-British Electrical Co., Ltd., is visiting Western Australia.

Because of ill-health **Mr. J. Bennie** is relinquishing his position as chairman and managing director of Bennie Lifts, Ltd.

Mr. J. W. Angus, production manager to Pyrotenax, Ltd., for the past nine years, has been appointed general manager and chief engineer of Hipprum Wires, Ltd.

Mr. T. H. Hall has resigned from Radiomains, Kettering, after fifteen years as chief engineer and general manager, but will continue as consulting engineer. He is now engaged in establishing radio relay services in Northants and Leicestershire.

Presentations were recently made to two long-service employees of **Johnson & Phillips, Ltd.,** who have retired. They are Mr. J. Cooper, foreman maintenance electrician (fifty-five years with the company) and Mr. F. Gladwell, foreman pattern maker (thirty-five years' service).

Workers at the factory of **S. Wolf & Co., Ltd.,** enjoyed their annual outing in a different manner this year. On 10th July they left Northolt in a number of aeroplanes for Bournemouth, where they enjoyed a full day by the sea until 9.30 p.m. when they flew back to London. One member of the canteen staff had her first air trip at the age of seventy-eight.

The sports ground of the **Telegraph Construction & Maintenance Co., Ltd.,** at Kidbrooke, requisitioned during the war, was officially re-opened on Saturday, 10th July, by Lord Colgrain, chairman of the company, on the occasion of the annual sports meeting of the Telcon Social and Athletic Club.

At the annual sports of **Elexcel, Ltd.,** held at Liverpool on 10th July the inter-company relay race was won by the B.I. Callender's team, with Automatic Telephone & Electric second and Elexcel third. B.I. Callender's were also first in the ladies' inter-company relay race.

Obituary

Mr. A. W. Hudson.—We regret to learn of the death, which occurred on 12th July, of Mr. A. W. Hudson, director and works manager of Frederick Thomas & Co., Ltd. He was sixty-two and had been with the company for over forty years.

Mr. E. J. Hall.—The death occurred on 15th July at Reigate of Mr. Edward John Hall, for many years with Babcock & Wilcox, Ltd.

Mr. D. B. Hoseason.—We deeply regret to report the death last Friday at the Royal Berkshire Hospital, as a result of a motor accident, of Mr. Donald Bright Hoseason, M.I.E.E., M.I.MECH.E., M.AMER.I.E.E.

The late Mr. D. B. Hoseason

Director of Studies at the Administrative Staff College at Henley-on-Thames. Mr. Hoseason, who was forty-nine, was a native of Leek, Staffs. He was educated at Borden Grammar School, Kent, and the Manchester College of Technology, of which he was an Associate. After serving his apprenticeship with the British Westinghouse Co., Ltd., Trafford Park, he went in 1930 to the Metropolitan-Vickers Electrical Co., Ltd., holding the positions successively of electrical machine designer, engineer-in-charge of motor development and chief engineer to the Motor Department. In 1940 he became electrical director and director of education and training to the Brush Co., and was appointed assistant managing director in 1945. He went to the Administrative Staff College in February last year. Mr. Hoseason was awarded the Hopkinson Premium of the Institution of Electrical Engineers in 1928 and the Willans Premium in 1930. He was a vice-president of the I.E.E. and was chairman of the East Midland Sub-Centre in 1945-46.

A memorial service is being held at the King's Chapel of the Savoy, London, W.C.2, to-day (Friday) at noon, where an address will be given by Sir Arthur Fleming.

Electronics Exhibition

THE third of the annual exhibitions organized by the North-West Branch of the Institution of Electronics (20th to 22nd July) was housed as before in the College of Technology at Manchester. Among the exhibits the Metropolitan-Vickers Electrical Co., Ltd., had its latest powder camera (9 cm diameter), vacuum pumps with gauges and control units, "Metrosil" non-linear resistors and servo-mechanisms.

Mullard Electronic Products, Ltd., displayed valves of normal and special types, including the miniature all-glass variety and the new range of sub-miniatures, flash tubes, miniature vacuum photocells, rectifiers and power valves.

The many uses to which batteries are put in this kind of equipment were demonstrated by the Chloride Electrical Storage Co., Ltd. Ferranti, Ltd., displayed the "Tesvac" portable source of h.f. energy for use as a vacuum testing device. Servo mechanisms, precision test equipment for cathode-ray tubes, special-purpose valves and lamps were also shown.

Industry and the House

The Steel Industry — Rural Supplies — Quantity Discounts

WHEN Mr. Herbert Morrison announced in the House that there would be a short autumn session from 14th September to the end of the month it became clear that the Government is intending to proceed with a Bill to nationalize the iron and steel industry. The purpose of the short autumn session is to resubmit to the Lords the Bill curtailing their powers. The Government expects that this Bill will again be rejected by the Upper House and it will be resubmitted during the following session, which commences on 26th October. During this session the iron and steel Bill will be passed through all its stages in the Commons, and presumably it will once more be rejected by the Lords.

In a final session at the end of 1949 and the beginning of 1950 the powers Bill will receive the Royal Assent and the steel Bill will become law under the retrospective effect of the powers Bill. It thus appears probable that the Government will have an Act to nationalize the steel industry on the Statute Book at the time of the next General Election, but that it will be left to the vote of the people to decide whether it should be implemented by the return of the Government to power as the result of that election.

By F. J. Erroll,
M.A., A.M.I.E.E., M.P.

In the meantime the general shortage of steel continues to attract the attention of the House and Mr. Lewis, the Labour M.P. for Bolton, has attributed the delay in the extension of the television service to the shortage of steel for the necessary transmission equipment. The Minister of Supply in his reply pointed out that manufacturers had been allotted all the materials they required, and that the production of receivers was limited not by a lack of steel, but by a shortage of cathode-ray tubes.

The shortage of steel wire which has seriously delayed the completion of armoured cables at some cable manufacturers' works is not due to wire being a " directed " export since, according to Mr. Belcher in his reply to Mr. Martin Lindsay, Britain's trade agreements do not specify particular types of steel. He added that there is only one exception, namely the recent agreement with Brazil, which includes an estimate of the quantity of ferrous wire to be supplied, representing about one per cent of the wire which Britain expects to export in 1948.

As was to be expected, the Conservative Agricultural Charter, which outlines that Party's policy for agriculture, comes out strongly in favour of an extension of rural electricity supplies. It says: " We shall support the claims of the rural population for a liberal share in the nation's supplies of electrical equipment." The Charter goes on to point out that the country has always lagged behind the town in electricity supplies, and that technical difficulties, and not rural prejudices, account for this. The Charter estimates that only about one-third of Britain's farms have electricity, and that half of these use it for lighting only. As it is expected that farmers will in future solve more of their problems by the use of electrically driven machinery, all circuits must be capable of taking power as well as a lighting load. As considerable progress had been made in rural electrification before the war the main network of supply cables has largely been completed. The present problem is to find the materials to connect the farms and cottages to the main cables. The authors of the Charter fully realize the size of the problem—they estimate that 900,000 poles and 100,000 miles of wire are needed for the farms alone—and that rural claims necessarily compete with the urban housing programme.

The quantity discounts granted to the British Electricity Authority, to which reference was made in " Industry and the House " appearing in the *Electrical Review* of 9th July, represent, it is understood, a compromise between the various arrangements existing with the different undertakings before nationalization. Thus the Electrical Wholesalers' Federation points out that the 10 per cent quantity discounts are the maximum quantity terms that may be granted, but it does not follow that all electrical manufacturers will grant such terms.

Apparently some manufacturers who have never given preferential terms to supply authorities prior to nationalization are determined not to do so now. There are others who will give the quantity terms up to 10 per cent on the clear condition that the terms apply only to quantity orders.

There are yet others who are granting the B.E.A. the best contractors' terms, which terms they would automatically earn during a year's trading.

The Electrical Fair Trading Council defends the granting of a quantity discount on the grounds that electricity supply undertakings normally purchase consumer products for the purpose of reselling them to the public. Thus manufacturers and suppliers who support the Fair Trading Policy regard the B.E.A. as retailers of electrical products and therefore classify that body for trade terms (subject to quantity buying terms) in line with the contracting/retailing section of the industry. Under the Fair Trading Policy, electrical wholesalers are expected to operate the terms set by the individual manufacturers. This Policy provides that quantity terms may be allowed to distributors of electrical products based on their individual or period purchases; thus it does not follow that quantity terms are limited to orders scheduled for delivery to one destination.

Nevertheless, some electrical wholesalers are deeply disturbed at the present trend of events and it is all to the good that M.P.s interested in trade and industrial affairs should be getting this opportunity of studying the ramifications of the electrical manufacturing and distributing trades.

PARLIAMENTARY NEWS

By Our Special Reporter

REPLYING to Mr. J. Lewis in the House of Commons last week, the Minister of Supply (Mr. G. Strauss) said that manufacturers of television transmitting equipment had been allocated all the materials they needed at present. The production of receivers was limited not by lack of steel, but by a shortage of cathode-ray tubes, due to manufacturing difficulties which were being gradually overcome.

Electricity Accounts

Replying to a question by Mr. H. Hynd, Mr. Gaitskell said that the temporary arrangements under which some local authorities were carrying out certain services on behalf of Electricity Boards, including the collection of accounts, were, he was informed, working satisfactorily. The question whether similar arrangements should be adopted in the case of gas would be a matter for the Area Gas Boards and the local authorities concerned.

Children Killed on Railways

Colonel Clarke asked the Minister of Transport how many children had been electrocuted on the railways in Kent, Surrey and Sussex during the last five years. Mr. Barnes said that the figures were 13, 6, 18, 7 and 5 respectively for the years 1943 to 1947. No fatalities to children had been reported during the first half of 1948. He agreed that the figures were very disturbing, but was glad to notice that there was a steady decline. The problem of fencing miles of electrified line was a difficult one, and even then it would be difficult to prevent the children from climbing the fences.

Killing of Whales

In reply to Mr. Skeffington-Lodge, Mr. T. W. Williams, Minister of Agriculture, said that the search into more humane methods of whale killing had been pursued by interested parties for several years. An apparatus had been developed for killing whales by electricity which will be tried out by a British whaling company during the forthcoming season.

Export of Refrigerators

Mr. Geoffrey Cooper asked the Minister of Supply why we were exporting refrigerators at an average conversion rate of £355 per ton and the Trade and Navigation Returns showed that we imported refrigerators at £737 per ton, amounting to £130,000 worth of refrigerators, during the first four months of this year; and if he would look into this with a view to permitting British manufacturers to supply the home market and then export their surplus, so saving dollars.

Mr. G. Strauss said that licences for the importation of complete domestic refrigerators were granted for only limited quantities under the token import scheme and for samples to use as prototypes for manufacture in this country. Imports consisted mainly of certain parts not made in this country and of spares for the repair of refrigerators of foreign manufacture. They were of much greater value per ton of steel than complete refrigerators.

Engineering Mission to Canada

In reply to Mr. Erroll, Mr. Bottomley said that the objects of the forthcoming engineering mission to Canada were to investigate market possibilities mainly for the heavier types of industrial engineering equipment; to obtain first-hand information on any difficulties in regard to trade with Canada in the engineering industry and to advise on the most suitable methods to adopt to secure a greater volume of exports from this country. The mission was sponsored by the Board of Trade and the charge on public funds was expected to be about £5,000.

Treatment of Milk

Electrical Conductivity and Sterilization

By F. A. Benson, M.Eng.

TESTS made about thirty years ago by Coste and Shelbourn[1] showed that the electrical conductivity of milk did not yield an exact indication of its water content. In some recent tests the author measured the resistances of columns of milk placed in a glass cell containing copper electrodes $\frac{3}{32}$ in. diam. and $3\frac{1}{4}$ in. apart (Fig. 1) and found that its ohmic value varied with the strength of current passed through it (Fig. 2) and with the amount of added water. The resistance variation was slight up to 50 per cent of added water but increased rapidly with further dilution (Figs. 3 and 4).

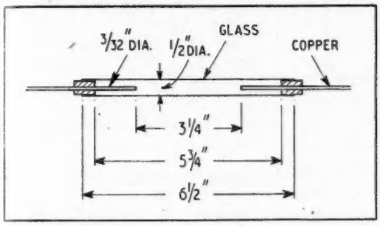


Fig. 1.—Glass cell containing copper electrodes

In a large number of milk samples obtained from seven retailers, the resistance varied from 6,100 to 7,400 ohms with a constant current of 200 μA, but in 90 per cent of the cases the value was between 6,500 and 6,700 ohms. It was also found that the resistance fell rapidly as the temperature rose.

An instrument which depends for its operation on the increase of electrical conductivity of milk with increasing percentages of sodium chloride has been developed for indicating udder trouble. Milk from all quarters of a healthy cow has nearly the same sodium chloride content, but an abnormality, such as mastitis, gives a greater proportion in the milk from the affected quarter.

Experiments were carried out over many years in the University of Liverpool by Thornton, Lewis, Beattie, Shelmerdine and others,[2, 3] to devise a method of sterilizing milk electrically. To observe the effects of a.c., milk was allowed to flow by gravity at constant speed through a $\frac{3}{4}$-in. (1·9-cm) glass tube, which was held between copper electrodes maintained at a p.d. of 3,000 to 4,000 V at 50 cycles. The milk to be treated was placed in a tank (Fig. 5) from which a second tank was fed through a ball valve which ensured a constant level in the latter. After passing three electrodes it was run off into a sterilized receiver. The time taken to flow through the "lethal tube" was about 15 sec and the energy used amounted

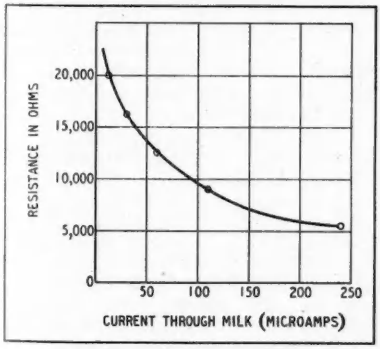


Fig. 2.—Variation of resistance of a column of milk with current passing through it; temperature of milk 56·3 deg F (13·5 deg C)

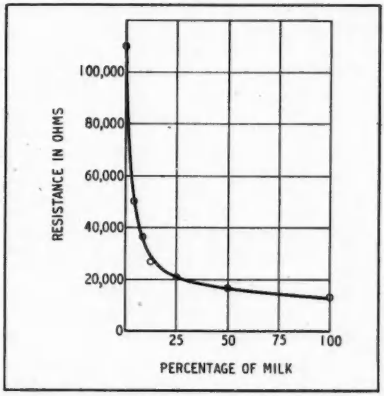


Fig. 3.—Variation of resistance of milk sample as water is added. Current, 57 μA; temperature, 56·3 deg F (13·5 deg C)

to some 0·43 kWh per gal. (0·94 kWh per litre). By this treatment the bacteria in milk deliberately contaminated or taken from markedly tubercular cows were greatly reduced.

Guinea pigs inoculated with the treated milk were found to be healthy, whereas others inoculated with the contaminated milk were found, after six weeks, to be tubercular.

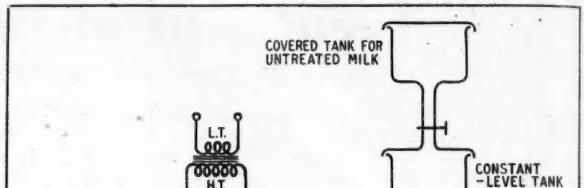


Fig. 5.—Apparatus for a.c. treatment of milk

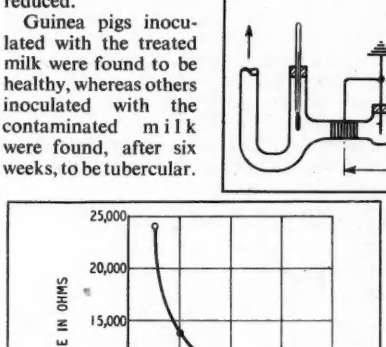


Fig. 4.—Variation of resistance of milk sample as water is added. Current, 200 μA; temperature, 59 deg F (15 deg C)

No difference in the flavour of the milk before or after treatment could be distinguished.

The treated milk reacted to the usual enzyme tests; no trace of copper could be found in it, the percentages of fat and sugar remained the same, and during the hottest weather it remained fresh for three days. Butter made from it was quite satisfactory in quantity and quality. Although at the time of the experiments it was considered that heating played no appreciable part in sterilization, the author believes the contrary to be true, since the temperature was raised to about 65 deg F (18·3 deg C) during the process and, further, the keeping quality of the milk improved as its initial temperature was raised.

To determine the effects of d.c., 0·15 A at 100 V was passed through milk in a 0·6-in. (1·5-cm) glass tube containing platinum electrodes about 4 in. (10 cm) apart. A few minutes after switching on, the milk near the positive electrode began to curdle and a froth appeared near the negative one. After 15 min. the milk round the positive electrode turned to a mass of hard curds strongly acid in taste, while at the negative electrode there was a yellowish-white whey, which tasted metallic. Elsewhere in the tube the milk remained fresh and had a normal taste, showing that the cause of the change at the electrodes was due to direct ionization and not to the passage of current. The effect of liberated gases was unimportant, since no such results followed the passage of oxygen and hydrogen through the milk. Even if the milk in the centre had proved to be bacteria-

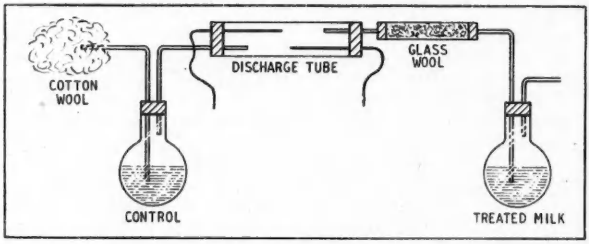


Fig. 6.—Equipment for electrical discharge experiments

free, the large percentage wasted would make the method impracticable. Passing d.c. through the tube after adding small quantities of sodium chloride to produce electrochemical sterilization yielded no useful results on account of chemical changes in the milk.

The effects of electrical discharges were studied by Duffield and Murray[4], who drew air by a pump, together with any products from the discharge for an hour through a glass bottle containing milk (Fig. 6). The discharge was produced by an induction coil between two brass points 1·5 in. (4 cm) apart. Results suggested some sterilizing action, and treated milk remained fresh for five days, but it would probably undergo chemical change.

Electrical or Chemical?

Attempts were later made to determine whether sterilization was due to electrical or chemical causes. Chemical products of the discharge were chiefly ozone with oxides of nitrogen, and if these were passed through the milk their responsibility for the sterilizing action could be readily determined. Oxygen was removed by drawing the air through a tube containing red-hot copper filings; the remaining gases, mostly nitrogen, were passed through the milk after traversing the glass wool. Ozone almost certainly produces inhibitory action, which may account for part of the sterilization, but is deleterious in regard to the milk.

Ultra-violet rays from mercury-vapour lamps were used by Lembke and Rayha[5] at Lubeck for milk sterilization. The milk flowed through quartz tubes at an average velocity of 140 cm per sec. Operating current per lamp was 50 mA and the overall efficiency about 80 per cent. At 86 deg F (30 deg C) about 85 per cent of the total emission was in the 2,537 A.U. wavelength, which was found to be the optimum wavelength for bactericidal effects.

Total exposure time was 70 sec, and the distance between milk tubes and lamps varied from 2 ft 6 in. (0·76 m) to 4 ft 8 in. (1·42 m). A 1-kW heater at the bottom of the steel lamp-cabinet maintained the air temperature at 86 deg F (30 deg C) for two reasons, first, the efficiency of the mercury-vapour lamp was greatly reduced below that value and, secondly, the ultra-violet rays do not penetrate milk to a depth greater than about 1 mm, and the viscosity of the milk becomes too great at low temperatures to allow enough turbulence for the bacteria to reach the outer layers often enough to be killed. Results indicated an increase in the vitamin D content of the milk with a reduction in bacteria content below that of laboratory pasteurization at 135 deg F (63 deg C) for 30 min. Surviving bacteria, however, differed from those surviving heat treatment and keeping quality of milk containing these bacteria may be lower.

Experiments have recently been carried out by Nyrop[6] in Copenhagen to determine the effect of radio-frequency currents on bacteria in liquids at temperatures low enough to exclude heat effects. Using a current of 20 Mc/s frequency, modulated with 10 to 100 kc/s, 99·6 per cent of bacteria in a liquid containing B coli were killed in 5 sec when the field strength was 205 V per cm, and 99·88 per cent in 10 sec. Milk so treated kept as long as milk heated to 167 deg F (75 deg C) for half an hour.

The bactericidal properties of cathode rays from a 155-kV Coolidge tube and of X-rays from a 12-kV (peak) tungsten-target tube have been found by Wyckoff and Rivers[7,8] to destroy B coli and B aertryke. The requisite dosages were large, but there appeared to be a logarithmic relation between the number of live bacteria per c.c. and time. It is possible that milk could be sterilized quickly by the use of very high intensity X-ray sources. There is much scope for experimental work on this subject.

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Second-hand Plant Prices

IT has been decided that it is no longer necessary to control the second-hand prices of contractors' and agricultural plant and an Order has been made revoking the Second-Hand Plant (Control of Prices) (No. 1) Order, 1942.

NEW BOOKS

Domestic Refrigeration. Introduction to Electrotechnology.

The Workshop Yearbook & Production Engineering Manual. Editor, H. C. Town, M.I.MECH.E., M.I.P.E. Pp. 568; 477 figs. Paul Elek Publishers, Ltd., 38, Hatton Garden, London, E.C.1. Price 35s.

This comprehensive guide to the latest machine shop practice is in three parts. The first surveys the trend of machine tool design and operation, cutting tools, hydraulic operation and the application of electronics to machine ools; the second covers the location and layout of industrial plants, precision engineering equipment, cutting tools and machinery and describes a number of recently introduced machine tools; the third part is composed of a series of articles on recent patents, machine design and construction, press operations, heat treatment, welding and cutting, machine drives and controls, etc.

Household Electric Refrigeration. By J. F. Wostrel and J. G. Praetz. Pp. 458; figs. 175. Second edition with index. McGraw-Hill Publishing Co., Ltd., Aldwych House, London, W.C.2. Price 27s. in United Kingdom.

This book outlines basic features of construction sufficiently to explain in simple language how the machines work for the guidance of service men. The first half of the book describes a number of makes of machines, both compression and absorption, all of them American; whole systems and detailed parts are illustrated and control devices explained.

The second portion deals with tools and instructions for installation and service adjustments, followed by fault diagnosis with many "trouble charts" indicating possible causes and remedies, terminating with tabulated data on refrigerants and lubrication.—W.O.F.

Introduction to Electrical Engineering. By G. V. Mueller. (2nd Edition.) Pp. 591; figs. 481; index. McGraw-Hill Publishing Co., Ltd. Price in U.K. 30s.

Books on electrotechnology are many and various and the facts and proofs that they contain have been now fairly well standardized. It is, therefore, to different methods of presentation that the reviewer is inclined to turn his interest. In this case the method adopted is unique.

The whole subject is treated from the point of view of three kinds of circuits: electric, magnetic and dielectric. The fundamental principles of the electric circuits are Kirchoff's Laws, of which Ohm's law is a special case. The author considers that some study of the response of a circuit to a transient difference of potential should be introduced quite early and the solution of a.c. problems should arise as a special case of this; "magnetic circuits" deal with all the problems of magnetism, while "dielectric circuits" deal with displacement currents and so with all the problems of capacitance. There is also a chapter on electrochemistry, which deals with primary and secondary cells.

We are not convinced that this method helps towards clarity. It might cause some confusion. There are always the two ways of teaching any subject. To run over it first in an elementary way and then repeat the survey with a more advanced treatment, or to insist that each step is completely explored in all its implications before the student is allowed to take the next. This book follows the second method.

Certain American terms sound unusual in our ears. "Arctan" for $\tan^{-1}$, "abvolt" for 10^{-8} volt; also great use is made of the "cirmil", the area of a circle of 1 mil diameter. In calculating the resistances of wires it is claimed that this avoids the continual incursion of π into the equation.—W.C.A.

Applied Electronics. By D. Hylton Thomas, M.SC.TECH., B.SC.(ENG.), A.M.I.E.E. Pp. 131; figs. and index. Blackie & Son, Ltd., 66, Chandos Place, London, W.C.2. Price 7s. 6d.

Although the title of this little book may suggest that its main concern is with the applications of electronic devices and the circuits in which they are used, it deals with fundamental properties in more detail than is often the case in this type of volume. The book is intended for students of Higher National Certificate standard, but it could probably be read with interest by some practising engineers. The explanations, while conventional, are in general clear and the author has not succumbed to the temptation to include too much detail likely to obscure the important characteristics. A few examples are worked out in the text and others are given at the end of each chapter.

There are a number of inaccuracies in the book, but fortunately they are not usually of the kind likely seriously to misinform the reader.—V.J.F.

The Industrial Future of Great Britain. (Pp. 208). Europa Publications, Ltd., 39, Bedford Square, London, W.C.1. Price 15s.

This volume reproduces a series of lectures arranged during last winter by the University of London and the Institute of Bankers. The scope is wide, including contributions by leading authorities in such subjects as fuel and power, iron and steel, agriculture, textiles, building, transport, finance and export. The lecturer on the last subject was Mr. Leslie Gamage (G.E.C.), president of the Institute of Export, with Mr. George Wansbrough, who is a director of the Bank of England and chairman of Reyrolle's, in the chair.

COMMERCE and INDUSTRY

British Industries Fair, 1949. Revised Coal Prices.

THE Board of Trade states that plans for the 1949 British Industries Fair are well advanced. Already application forms for space have been dispatched to all previous exhibitors and other interested firms. These are returnable by 7th August and inquiries already to hand indicate that the demand will be exceptionally heavy. Last year more than 600 late applicants could not be accommodated. The Fair is to be held in London and Birmingham from 2nd to 13th May.

For the 1949 Fair, as before, certain trade associations are co-operating with the Export Promotion Department in arranging uniform schemes of presentation. Participation in these special arrangements is not confined to association members and exhibititors may wish to take advantage of this and so secure full benefit from the co-ordinated displays. Interested manufacturers who have not received an application form should apply immediately to either the Export Promotion Department (Exhibitions Branch), 27, Old Queen Street, London, S.W.1, or to the Birmingham Chamber of Commerce, 95, New Street, Birmingham.

Electricity Output

During the week ended 9th July 713·3 million kWh of electricity was sent out for public supply from solid fuel fired stations (representing approximately 96 per cent of the total electricity sent out for public supply by all stations controlled by the British Electricity Authority and the North of Scotland Hydro-Electric Board). This compares with 712·2 million kWh in the previous week and 615·2 million kWh in the corresponding week of last year.

Coal Price Adjustments

For some time past the National Coal Board has been working out a new price structure which would reflect more closely the relative value to the consumer of various classes of coal. Although this has not been completed the Board is making interim adjustments in such a way that increases will be balanced by decreases.

From 19th July the present prices of lower grades of coal, mainly "untreated smalls," will be reduced by amounts varying from a few pence to as much as 15s. per ton, according to quality. Prices of higher grades (mainly large and graded coals) will be increased by amounts varying from a few pence to about 3s. per ton; exceptionally for the highest qualities, the increase will be a shilling or two more. The price of other grades, including coals usually supplied under existing restrictions to the domestic consumer, will remain unchanged.

The adjustments will not clear away all the anomalies which have grown up during and since the war as a result of the application of uniform price increases to all qualities of coal, but it is claimed that they will go quite a long way towards removing them and will, at the same time, provide consumers with an incentive to use more of the lower quality coals and less of the higher quality required for export.

Contract Price Adjustment Formulæ

The following are the latest figures for use with the B.E.A.M.A. contract price adjustment formulæ:—Rate of pay for adult male labour, 10th July, 110s. (unchanged). Board of Trade index figure for intermediate products, 10th July, 250·9, being the figure for the month of June (against 248·9 for May).

Development in the North-East

Firms which have started new light industries in the North-East in recent years have decided to form a development committee. A preliminary meeting on the matter has already been held, and Mr. D. H. Niblett, of Wright & Weaire, Simonside, South Shields, has been appointed convener of meetings. Other interested firms have been invited to get into touch with Mr. Niblett. Another meeting is to be held about the middle of August.

New Fluorescent Lamps

As from 1st September members of the Electric Lamp Manufacturers' Association will be marketing fluorescent lamps in a new colour called "natural." Hitherto, the 5-ft and 4-ft lamps have been available in "warm white" and "daylight" colours, but a need has been felt for a light source giving a more natural colour rendering. It is expected that the new colour will find special application in shops and stores. The recently introduced 2-ft 40-W and 2-ft 20-W lamps will also be available in "natural."

Some time ago E.L.M.A. members announced their contemplated range of fluorescent lamps and the two remaining sizes will be marketed on 1st October next, the 3-ft 30-W and 1½-ft 15-W, both in "warm white" and "natural," list price 11s. 6d. each.

Generation on Merseyside

Mr. A. R. Cooper, divisional officer, Merseyside and North Wales Division of the British Electricity Authority, stated last week that generating plant available since 1st April was 72·9 per cent, which was a creditable performance for a period of the year when the summer overhaul was in progress. The installation of hydrogen-cooled generators was a major step forward in this country. The estimated cost of total new construction in hand and projected

in the Division was about £24,000,000. Investigations were being made for a new power station costing £6,000,000 within 20 miles of the Dee. Bromborough's new £9,000,000 power station should be constructed by 1953 and the first of its four 50,000-kW sets would be in operation early in 1957. Extensions at Clarence Dock, Liverpool, would cost £3,000,000, and further extensions £2,000,000.

Yorkshire Load Spreading

The spreading of electricity load in the East and West Ridings of Yorkshire, embracing commercial as well as industrial users, will begin in October. The "spread" for that month will probably be 7½ per cent between 8 a.m. and noon and no additional load will be accepted between 4 p.m. and 5 p.m. For other months the "spread" will be: November, December, January and February, 20 per cent between 8 a.m. and noon and 20 per cent between 4 p.m. and 5.30 p.m.; March, 20 per cent between 8 a.m. and noon and no additional load between 4 p.m. and 5 p.m.

Photography and Design

The first exhibition of its kind, comprising good photographs of well-designed objects, has been arranged jointly by the Royal Photographic Society and the Design and Industries Association. Opening the exhibition at 16, Prince's Gate, South Kensington, Mr. Gordon Russell, Director of the Council of Industrial Design, said that the expert photographer had an important role to play in industry by showing the finest photographs of the finest products. He hoped the exhibition would become an annual event, and would be copied in various centres up and down the country. Manufacturers who did not pay attention to first-class photographs of their products might lose an immense amount of business.

Electrical Market Prospects

Reviewing the country's economic position, Sir Stafford Cripps, Chancellor of the Exchequer, said last week that in some fields a buyers' market was beginning to emerge, and a few industries producing non-essentials were running into difficulties. There had, for example, been an appreciable falling off in home demand for electric clocks, radio sets, domestic electrical appliances, etc. There was no reason to regret that this was happening. It was, in fact, just what they tried to bring about, and the process had certainly not yet reached the point when they should consider any steps to counteract it. Labour was still moving far too slowly into the undermanned industries; the attractions of the home market were still diminishing the pressure on manufacturers to export.

There was still a substantial unsatisfied demand for heavy electrical equipment, telephone apparatus, etc., and manufacturers' order books were often full for years ahead. Exports of electrical goods and apparatus all made better progress than was forecast during the first five months of the year. The products we were at present having the greatest difficulty in selling abroad were in general the same as those which were meeting resistance in the home market—domestic equipment, radio sets and various types of luxury goods, because other countries like ourselves could not afford to continue their importation.

If, as a result of the various international and inter-Commonwealth economic policies now afoot, we could achieve the expansion of world markets that we were seeking, the position regarding these goods should be improved. To meet the present situation we should be prepared to adapt our output to the changing demand from overseas. If more capital goods were wanted, we must expand our production of those at the price, if necessary, of consumer goods for which there was less demand.

Research in India and Pakistan

We have received from the Export Promotion Department of the Board of Trade a list of subjects in which industrial research is being pursued in a number of universities and other establishments in India and Pakistan. It is suggested that this list would be of interest to United Kingdom manufacturers of materials and equipment for laboratory use. The address of the Export Promotion Department is Thames House North, Millbank, London, S.W.1, and the reference E.P.D. 36499/48.

Export Licensing Branch

From 3rd August the section of the Board of Trade Export Licensing Branch operating from 4, Fenchurch Avenue, will be removed to Regis House, King William Street, London, E.C.4 (telephone: Avenue 3111). The headquarters of the Branch will remain at Stafford House, King William Street, E.C.4 (telephone: Mansion House 4555).

Overseas Inquiries

The Electric Light Company of Mahon (La Electrica Mahonesa S.A.), Balearic Islands, wishes to purchase a steam turbo-alternator group of 800 kW. Further information can be obtained from the Export Promotion Department, Thames House North, Millbank (Ref. E.P.D. 36841/48.)

Gonzalez, Castleton & Shaw, S.A. Suipacha 759, Buenos Aires, wish to get in touch with United Kingdom manufacturers of certain household appliances (except washing machines and vacuum cleaners). They are particularly interested in refrigerators, toasters, irons, mixers, kettles and cookers.

As currency restrictions preclude importation from dollar sources into Northern and Southern Rhodesia, a Johannesburg company wishes to

obtain British sources of supply for various electrical and other goods, including cookers, refrigerators, vacuum cleaners, washing machines, toasters, electric percolators, radio apparatus, battery chargers, soldering irons, etc. (Export Promotion Department Ref. 35814/48.)

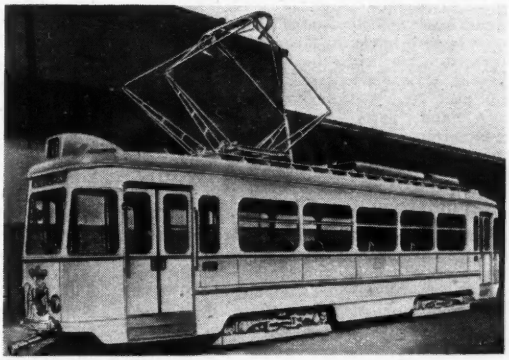
Quotations are invited by the Controller of Imports at Belize, British Honduras, for the supply of specified screw-base electric lamps. (E.P.D. Ref. 37628/48.)

German Industrial Technique

Recently published reports on German industry obtainable from H.M. Stationery Office include BIOS 1750, "Arc Welding Equipment and Electrodes and Welding Applications in Germany" (20s.).

Equipment for Hague Tramways

To increase the passenger capacity of the Hague Tramways, sixteen tramcars of a new type are being built locally from equipment supplied by various manufacturers, including Crompton Parkinson, Ltd. (traction motors) and the Westinghouse Brake & Signal Co., Ltd. (air brake devices). The Hague car, which is 43 ft long and 7·2 ft wide, seats 30 passengers with 60 to 70 standing. It is designed to operate either as a single unit or with one or two trailers. As a single unit the maximum speed is about 37 m.p.h. Braking can be effected by four methods—rheostatic, air, electro-magnetic, hand.



New tramcar for the Hague

The bogies are two axle units which allow for four 62-h.p. motors per car instead of two, thus providing for a higher rate of acceleration. The motors are of Crompton Parkinson type C123, a box-frame interpole self-ventilated design of reduced weight.

In addition to the sixty-four motors of 62 h.p. for the new cars, Crompton Parkinson, Ltd., is supplying sixty of 90 h.p. for replacements on old cars.

Apprenticeship Schemes

A revised series of apprentice training schemes is being inaugurated as from 16th August in the Bushbury Engineering Works, Wolverhampton, of the Electric Construction Co., Ltd. An illustrated booklet (ref.: AP/2) has been issued as a guide to the much wider scope of the scheme and the extended opportunities it offers to trainees. Premiums are not payable in respect of any of the four types of apprenticeships now made available. Craft apprentices showing exceptional ability are encouraged to move into the technical grade and those who so desire into the engineering grade, while drawing-office apprenticeships are also offered. The courses are of five, four and three years' duration. Every encouragement, including time off with pay, is given to trainees to attend part-time day courses at a recognized technical institution. Rates of pay and conditions of training are agreed with trade union representatives, while forms of indenture (free of charge save for 2s. 6d. stamp duty) are endorsed upon completion with details of experience gained. The scheme is under the control of the works superintendent, who has the support of an advisory committee of engineers, which interviews candidates and is available to apprentices for consultation during their training periods.

B.E.A. Supports Institute of Fuel

The British Electricity Authority is contributing £2,000 (inclusive of £830 already contributed by former electricity undertakings) to the Institute of Fuel's £25,000 building fund which is being raised for alterations, decoration and furnishing of the new headquarters at 18, Devonshire Street, London, W.1. The Authority has accepted collective membership of the Institute, of which, before vesting day, twenty-five electricity undertakings were members. The Central Authority will have four members and each of the fourteen generating divisions two.

Consumer Sampling

A Technical Report, Ref. K/T118, has been issued by the British Electrical and Allied Industries Research Association on "Some Aspects of Sampling as Applied to Electricity Supply," by P. Schiller (14s. net). Measurement of appliance-saturation factors through sampling of attributes, e.g., the percentage of consumers in a given area possessing vacuum cleaners, formed the subject of a previous report (Ref. K/T113). If, however,

a characteristic can have any one of a plurality of values, as, for instance, the installed load, the reference is usually the average, either as a measure in itself or, after multiplication by the total number involved, as a measure of the total quantity. The problem then is to ascertain the minimum size of sample to give the information required within a given margin of error, or, having found the sample-average, to assess a margin of error within which the true value lies. Sometimes the interest will centre on the distribution of a variable quantity over given classes, e.g., the number of consumers having annual or quarterly kWh consumptions within the various blocks of a block tariff. The principle sampling formulæ are summarized in the Report for easy reference. A minimum of statistical mathematics is used to give a general idea of the theory. Supplementary information is contained in one appendix; another illustrates conditions encountered in practice, and a third gives guidance on computation.

Chinese Import Duty Amendments

The *Board of Trade Journal* (26th June) reports amendments made in Chinese import duties in accordance with the Geneva Agreement. Among items affected are dynamos and motors not over 20 kW, transformers not over 200 kVA and parts or accessories, boilers, economizers, mechanical stokers, buzzers, radio receiving valves, battery eliminators, jacks and plugs.

Equipment for Olympic Games

The British Broadcasting Corporation has set up a complete broadcasting centre at Wembley which will distribute commentaries on the main events of the Olympic Games. To ensure synchronization of programmes this broadcasting centre, which includes studios, recording rooms, reproducing rooms and offices, will be equipped with a controlled clock system comprising fifty-five clocks and a master clock made by Gent & Co., Ltd.

The public address arrangements for nearly all the Olympic Games programme have been entrusted to Philips Electrical, Ltd. Hundreds of loud-speakers, many microphones and miles of wire are to be used in equipping the various arenas and stadiums occupied by the contests. Wembley, Windsor, Aldershot and three London Club grounds will use Philips sound reproduction equipment for the benefit of the vast crowds that will gather.

Diesel Plant for Scotland

The North of Scotland Hydro-Electric Board, to increase the generating capacity of its stations in isolated areas, has placed with British Polar Engines, Ltd., Glasgow, the largest post-war order for their type of engine. The order comprises ten 1,000-kW diesel engines and six 300-kW diesel engine alternators. The 1,000-kW diesel engines will be fitted with alternators made by Bruce Peebles & Co., Ltd. The six smaller units are an improved design of the British Polar engine, the prototype of which is being tested at the present moment. The engines for the Hydro-Electric Board will be manufactured in a new factory which the company is building near its existing works. The generating plant is required to deal with the increasing demand for electricity at Lerwick, Kirkwall, Wick, Campbeltown, Stornoway, Dunoon, Ardrishaig, Tiree, Islay, Ullapool, South Uist, and other places where a supply of hydro-electric power cannot be made available.

Annual Holidays

The works of Brookhirst Switchgear, Ltd., will be closed from 24th July until 2nd August inclusive.

The works and offices of Gillott Electro-Steam Cookers, Ltd., will be closed from 24th July to 2nd August.

The works and offices of J. & H. McLaren, Ltd., Leeds, will be closed from 23rd July till 3rd August.

Mirrlees, Bickerton & Day, Ltd., Hazel Grove, Stockport, will be closing their works and offices from 6th to 16th August.

Trade Announcements

David Brown & Sons (Huddersfield), Ltd., announce that with effect from 31st July their London office (now at Haymont House, Haymarket) will occupy premises on the ground floor of Bush House, Aldwych (telephone: Temple Bar 0867).

Johnson & Phillips, Ltd., and their domestic appliances section, **British National Electrics, Ltd.,** have opened a branch at 41, Pilcher Gate, Nottingham (telephone: Nottingham 40052-3; telegrams: "Selbac, Nottingham), under the control of Mr. J. Wilson. Stocks will be maintained of J. & P. cables and British National domestic appliances.

The directors of the **National Gas & Oil Engine Co., Ltd.,** have notified their agents and customers that they are discontinuing the manufacture of a number of sizes of engines. It is expected that the output of engines will be increased. The directors wish to make it clear that no negotiations of any kind are in progress, or intended, to alter the status of the company or to link it with other manufacturers of oil engines.

Having terminated their agency agreement, **George Ellison, Ltd.,** announce that future sales of Ellison switchgear and "Tufnol" in South Africa and the Rhodesias will be handled by George Ellison S.A. (Pty.), Ltd., who have opened offices at 33, Stability Unit House, Simmonds Street, Johannesburg. Mr. S. J. C. Wells has been appointed manager. The Ellison representation in Natal and South African Collieries will remain in the hands of F. G. Licence (Pty.), Ltd., Durban.

Domestic-Load Control

Relay Operated by Change in Supply Frequency

By J. de Gruchy, M.Brit.I.R.E.*

THE provision of a remotely operated relay for limiting the domestic demand in order to minimize the ill-effects to industry of low voltages and load shedding was urged by Mr. E. M. Ackery in the *Electrical Review* of 12th March. The capital cost of the installation programme this would entail could be justified only in terms of a consequent saving in generating plant capacity.

Since such a relay would be required to operate only when the system was overloaded, a symptom of that condition might be used to bring it into circuit, thus simplifying the remote-control requirement. In the past the symptoms of overload have been a fall in both supply voltage and system frequency. It is undesirable to lower the voltage as a load-shedding device, in view of the adverse effect this would have on industrial efficiency, so the control function should operate from a small decrease in frequency.

A scheme that has been investigated by the writer incorporates a moving-coil frequency relay, provided with considerable overlap to prevent hunting. As an example, it could be set to operate at 49 cycles per sec, and to restore normal conditions at 50·5 cycles. The advantage of such a characteristic is that when the system frequency is let down to the lower value the excess domestic load is shed, after which the frequency can be returned to normal for the remainder of the peak period and then raised to pick up the domestic excess when the industrial peak has passed.

The moving-coil relay is actuated by a phase-sensitive bridge which measures the phase and magnitude of the current flowing into a tuned circuit (Fig. 1). At resonance two equal and opposite voltages appear across the output resistors R_1 and R_2 of the phase-sensitive bridge. These resistors are actually the windings on the moving-coil relay and thus when the supply frequency is normal no torque is exerted.

When the frequency falls, the state of balance in the tuned circuit is destroyed, its feed current increases and the phase angle of the feed current shifts. These two resultants give an increase of current in R_1 and a decrease in R_2 causing the coil to rotate and operate the overload relay circuit. This can be carried out conveniently by winding a secondary on an overcurrent relay and holding it short-circuited when the moving coil is in its balanced or non-operative position.

The effect would be to automatically lower the setting of the overcurrent relay during peak periods. Note that the domestic consumer is not disconnected as at present, but only obliged to lower his maximum demand.

By shaping the pole pieces so that R_2, the coil carrying the lesser current when frequency is low, moves into a weaker field, a snap action is achieved. At the same time the desired overlap is obtained, since a considerable increase in R_2 current, relative to that in R_1, will be required to bring the relay back to its balance position. Once again the field distortion will assist in providing a snap return.

Since the output component is proportional to I cos ϕ, where I is the feed current and ϕ the angle of that current relative to the voltage across one of the tuned-circuit reactors, the system can be made to operate for quite small changes of frequency. Experimental models are working at differences of 0·5 cycle. The power consumption is 2VA.

The equipment envisaged for a domestic consumer's installation comprises the frequency relay and a circuit breaker, which could be mounted conveniently in a small sealed container and wired between the company's fuse and the meter. The circuit breaker could be a conventional unit with an additional winding for flux control;

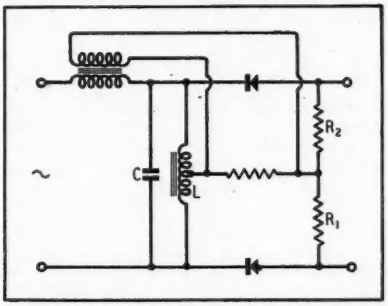


Fig. 1.—Moving-coil frequency-operated relay

* The author is with Everett Edgcumbe & Co., Ltd.

alternatively it might carry an electromagnetic latch operated by the frequency relay. The hand-reset mechanism must be of a free-handle or inertia pattern calculated to defeat the efforts of the dishonest consumer.

The operative current of the circuit breaker could be set in terms of the consumer's need such as size of premises, number of persons in residence and number of small children.

The advantages of the system are its simplicity and the large measure of peak reduction for small outlay that can be secured by selecting its users on the basis of their past records.

South African News

From Our Own Correspondent

THE Southern Rhodesian Minister of Finance has announced that it is the Government's intention to acquire the radio-telegraph service operated by Cable & Wireless, Ltd., in the colony. It was hoped that this will come into operation in January, 1949. The cost to the colony will be about £45,000.

Large Loan

Dr. H. J. van der Bijl's announcement of future expenditure by the Electricity Supply Commission of £40,000,000 to £50,000,000 on new power stations, in addition to the £14,500,000 to be paid to the Victoria Falls Co., is an indication that a new E.S.C. loan is in the offing. No official particulars are available, but the figure of £15,000,000 mentioned is the largest since loan No. 5 for £6,750,000 at 3¾ per cent was floated. There is some speculation about the terms of the new loan. The last loan was in 1946 for £3,000,000 at 3 per cent.

Assistance for Farmers

The Electricity Supply Commission in Southern Rhodesia is willing to advise groups of not less than five adjacent farmers on the electrical installations they need, prepare specifications, call for tenders for completing installations, act as the farmers' principal, pass the completed installations and pay the contractors. It will recover the cost, plus a small engineering fee, from the farmers either in cash or over two years. A hire-purchase scheme is also being prepared to help farmers buy electrical devices, as well as a hire scheme for portable apparatus of seasonal utility which can be removed from farm to farm.

Power Station Extensions

The Johannesburg City Council has applied for permission to proceed with extensions to the Orlando power station costing £7,203,000, and for further interconnection with the Rand system costing £900,000. At Port Elizabeth it is proposed to spend £255,275 on a boiler, a turbo-alternator, metering equipment and two transformers. The City Council has decided that the future supply to Port Elizabeth and district should be provided by the Electricity Supply Commission and is to ask for the immediate erection of a power station for an initial base bulk supply of 20,000 kW.

The deputy-mayor of East London has interviewed officials of the Electricity Supply Commission in Johannesburg in connection with the proposed new power station in that city. The officials assured him that East London was well to the fore in priority for the provision of new stations, and that plans were being proceeded with.

Developments at Kimberley

Considerable development has taken place recently in Kimberley's electricity supply system. A 33-mile overhead transmission line from the city to the Carrig Diamond Leicester Mine has enabled many farmers close to the Vaal River to obtain supplies. Negotiations between the De Beers Company and the E.S.C., for taking over the company's generating station at Kimberley are nearing completion. It is the intention of the Commission to go on supplying the municipality in bulk from the station, and also to establish a larger undertaking to provide electricity for industrial projects in the neighbourhood.

Newcastle Town Council intends to raise a loan of £50,000 for the purpose of extending the town's electricity system.

Municipal Electrical Convention

Between 11th and 14th May the twenty-second convention of the Association of Municipal Electricity Undertakings of South Africa and Southern Rhodesia was held in East London. Among the items considered were the reports of various sub-committees of the World Power Conference, the registration of electrical wiring contractors, the South African Bureau of Standards meter testing code, overhead wires and code of practice, the electrical wiremen's registration board, the coal commission, statistical tables, the Bureau of Standards safety codes and the South African Standards Institution.

Sodium Lighting Preferred

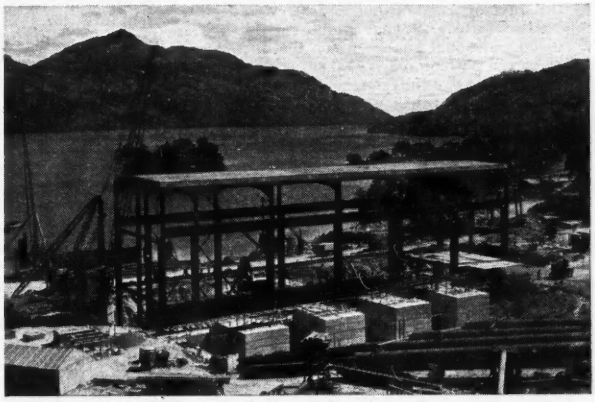
The city electrical engineer of Durban is satisfied that yellow sodium lighting is the best for traffic purposes, and when fittings are available it is intended to use these lamps on at least six miles of heavy traffic routes in Durban and eventually to double the lighting in important residential areas.

ELECTRICITY SUPPLY

Progress at Loch Sloy. Wells "All-Electric" Decision.

Ashton-under-Lyne. — STREET LIGHTING. — It is proposed to install electric lighting on the Richmond Street portion of Reyner Lane housing estate.

Birmingham.—DECREASED PROFITS.—Speaking at a meeting of the City Council, Alderman W. S. Lewis, who is chairman of the Midland Electricity Board, said that although the profit shown by the Electric Supply Department for the past year was £469,730, this figure included several non-recurring items such as credits from the Central Electricity Board and receipts from the sale of wagons to British Railways. The true profit was only £152 and thus unless prices were increased supply in the area would be given at a loss. Nationalization had nothing to do with it.



Against the background of Ben Lomond the new power station at Inveruglas (Loch Sloy scheme) is seen under construction

Dunfermline.—STREET LIGHTING.—The Burgh Council recommends the County Council to install electricity in North Queensferry instead of the present gas lighting.

Durham. — SCHOOL INSTALLATIONS. — The Ministry of Education has approved in principle the County Education Committee's plans for installing electric lighting at the Jarrow Grange County School. The Committee is considering introducing supplementary heating by either gas or electricity at the Kibblesworth County School.

Hyde.—LIGHTING IMPROVEMENTS.—The Electricity Committee proposes improved lighting in Ashton Road, Clarendon Road, Hoviley Brow and Commercial Street by erecting eighty-four new lamps at an estimated cost of £8,000.

North Western Area.—TARIFF REVISIONS.—The tariff adjustments outlined in the Board's announcement on 11th May will be applied in respect of all electricity consumed after the first meter reading following the 31st July. The revisions will put rural and urban consumers on a more equitable basis and correct the uneconomic tariffs inherited by the Board from many former undertakings. It had been hoped to announce the abolition of meter rents, but this is still being considered at national level.

Scotland.—LOCH SLOY POWER SCHEME.—Good progress is being made with the Loch Sloy hydro-electric scheme. The large power station at Inveruglas, on the shores of Loch Lomond, is now taking shape, as are the four large pipe lines which will carry the water to the turbines. The station will have a capacity of 130,000 kW.

Wells.—HOUSES TO BE "ALL-ELECTRIC."—It was stated at a meeting of the City Council that the South Western Electricity Board proposed to install a new transformer on the Burcott Road housing site, and the gas company had asked if it could lay mains. The Council decided that the houses should be "all-electric."

Wirral.—TIME SWITCHES.—The U.D.C. has decided to purchase during the next three years 150 time switches for street lighting costing £638.

TRANSPORT

Australia.—RAILWAY ELECTRIFICATION.—The electrification of the Adelaide surburban and hills railway lines, with the provision of a line from Woodville to Glenelg, is proposed at a cost of £3,824,900.

Gosforth.—OPPOSITION TO TROLLEY-BUSES.—Plans by the City Transport Department to extend the trolley-bus service to the garden village on the northern outskirts of Gosforth are being opposed by the local residents' association on the grounds that the poles and wires would spoil the village. Trolley-buses were introduced into the Gosforth area itself three months ago when the trams were abolished.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Scophony, Ltd.—Under a reconstruction scheme submitted to shareholders it is proposed to write down the 1,240,000 5s. shares to 1s. each and to issue 2,000,000 shares of 1s. each, of which 1,600,000 would be offered to present shareholders and the balance would be taken up by the directors. A further £60,000 would be raised by mortgage. That would provide the £160,000 additional finance which the directors estimate will be required (£93,000 for financing the new factory and the remainder for increasing stocks, providing working capital, etc.). It is stated that since 1st April the monthly production has shown an improvement of over 50 per cent compared with the corresponding period of last year.

A loss of £33,215 is shown in the accounts for the year ended 31st March (against a deficit of £41,818 for 1946-47), but it is pointed out that two-thirds of this amount was incurred in the first six months of the year (the new board took over late in 1947). If the proposed scheme is carried through without delay it is considered that the current year's trading result should not be unsatisfactory. Plans are in hand for extending the present range of products.

Victoria Falls & Transvaal Power Co.—The company's undertaking was transferred to the Electricity Supply Commission of South Africa on 1st July for the sum of £14,500,000, and the directors state that the contract for the transfer has been completed and executed. The annual meeting will, it is expected, be held early next month when the accounts for 1947 will be presented. No further annual accounts are likely to be issued, but the board anticipates calling stockholders together towards the end of the year for the purpose of putting the company into voluntary liquidation. Thereafter it should be possible to make an early distribution to preference stockholders and a substantial interim distribution to ordinary stockholders, with a final payment on settlement of the company's liabilities. Ordinary stockholders should receive not materially less than the present market value of their holdings.

Christy Brothers (Chelmsford), Ltd., are offering to the public 53,500 £1 ordinary shares and 24,002 5 per cent £1 preference shares at par. The company specializes in the installation of power plant for mills and factories and in hydro-electric installations. The former company of Christy Brothers was taken over as a holding company under the Electricity Act; it has bought back its offices and factory and has amalgamated with Christy & Norris, manufacturers of accessories for the milling and agricultural industries.

Ward & Goldstone, Ltd., in their accounts for the year ended 31st March last, show a net profit, after tax, of £132,724, compared with £128,179 for 1946-47, to which is added £153,514 brought forward. With a final payment of 30 per cent the year's ordinary dividend is unchanged at 50 per cent, £65,000 (£30,000) is set aside for future taxation, and £299,607 is carried forward.

Mr. A. A. Goldstone (chairman), in a statement issued with the report and accounts, refers particularly to the increase in the company's exports. The value of these was more than twice as much as in the preceding year and twenty times greater than in 1938-39. The subsidiary plant in the Wigan area is producing to full capacity and a nearby works has been purchased to meet the additional demand, chiefly in the wire and cable section.

Murex, Ltd., reports a profit for the ten months to 30th April last of £215,000, after providing £220,000 for taxation, as compared with a profit of £159,000 for the preceding twelve months. To the profit is added £32,000, surplus on the realization of an investment in an associated company. It is proposed to pay a final ordinary dividend for the period at the rate of 12½ per cent per annum, making 20 per cent per annum, the same rate as for the previous year.

Newman Industries, Ltd.—Mr. A. J. Newman, chairman and managing director, stated at the annual general meeting that the high-level demand which continued throughout the year showed little signs of slackening and their order book stood higher than ever. The company's policy of modernization and the pursuit of the attainment of the highest possible efficiency would ensure that the company could be at least competitive under most conditions.

British Klockner Switchgear, Ltd.—The Board of Trade is inviting tenders for the purchase, in one block, of 200 ordinary 5s. shares in the company. Particulars of sale are obtainable from the Administration of Enemy Property Department (Treasury and Board of Trade), T.E.4 (A), 7, Crosby Square, London, E.C.3.

The Globe Telegraph & Trust Co., Ltd., proposes to pay a final dividend of 2 per cent, maintaining the distribution for the year at 5 per cent, tax free.

H. J. Baldwin, Ltd., report a consolidated net profit, after taxation, for the year ended 31st March amounting to £29,707, compared with £18,510 for the previous year. A sum of £10,888 goes to reserve and the parent company's dividend is maintained at 25 per cent, leaving £27,186 (£23,767) to be carried forward.

The Mexican Light & Power Co., Ltd., is negotiating with the International Bank of

Reconstruction and Development for a $30 million loan required for a large expansion programme the company is planning and also to purchase materials abroad that cannot be obtained in Mexico. Another $30 million dollars will be needed from Mexican sources.

The Great Northern Telegraph Co.'s Holding Co., Ltd., is to pay a total dividend of 11 per cent, or 5·94 Danish kroner per share of kr. 54, and carry forward kr. 2,952·93.

Mather & Platt, Ltd., are again paying an interim dividend of 4 per cent.

New Companies

Ireco Products, Ltd.—Registered 30th June. Capital, £3,000. Manufacturers of, and dealers in, electrical goods of all kinds, etc. Directors: F. Wright (governing director) and T. Wright. Regd. office: Hanover Buildings, Fitzroy Street, Ashton-under-Lyne, Lancs.

Moreland Electrical Co., Ltd.—Registered 30th June. Capital, £100. Electrical engineers and contractors, etc. Directors: E. H. Fuggle and Margaret M. Fuggle. Regd. office: 23, The Avenue, West Ealing, W.13.

Alexander Lindsay, Ltd.—Registered in Edinburgh 28th June. Capital, £25,000. Electricians and electrical engineers, etc. Directors: A. Lindsay, D. G. Lindsay and A. Lindsay, jun. Regd. office: 173, Bath Street, Glasgow, C.2.

Televalves, Ltd.—Registered 8th July. Capital, £500. Manufacturers and factors of, dealers in, and designers and licensees of, gas-filled electric discharge valves and all equipment and apparatus in connection with high-speed radio or other telegraphy, etc. Directors: S. Lalewicz and E. Schubert. Regd. office: 129, Lower Addiscombe Road, Croydon.

Controlled Heating Units (London), Ltd.—Registered 7th July. Capital, £1,000. Heating, ventilating and general engineers, manufacturers of, and dealers in, heating units and their controlling apparatus, cooling and ventilating apparatus, etc. A. W. Hudson is the first director. Regd. office: 23a, Union Street, Kingston-on-Thames.

Walter Anderson, Ltd.—Registered in Belfast 6th July. Capital, £2,000. Electrical engineers, wireless and radio merchants, etc. Directors: W. G. Anderson and Mrs. A. J. Anderson. Regd. office: 77, Main Street, Portstewart.

George McCartney & Co., Ltd.—Registered in Belfast 1st July. Capital, £5,000. Electrical engineers, etc. Directors: G. H. McCartney, Mrs. M. E. McCartney and Patricia A. McCartney. Regd. office: 8, Great Victoria Street, Belfast.

Sheppee & Summers, Ltd.—Registered 30th June. Capital, £1,000. Electrical contractors and dealers. Permanent directors: R. V. Sheppee, Mrs. G. Sheppee, P. S. Summers and Mrs. V. E. Summers. Secretary: Norman F. Crouch, 1, Castle Square, Brighton.

John A. Quentin, Ltd.—Registered 30th June. Capital, £2,000. To acquire the business of an electrical contractor and engineer carried on by J. A. Quentin. Subscribers: J. A. Quentin and R. H. Farey. Regd. office: 105, Spring Road, Kempston, Beds.

Empire Electric Co. (Hounslow), Ltd.—Registered 30th June. Capital, £1,200. Electrical equipment specialists, etc. Permanent directors: H. Horeman, J. R. Huddle and F. Bridger. Regd. office: 3, Cavendish Parade, Bath Road, Hounslow.

R. L. Muir Electrical Installations, Ltd.—Registered 30th June. Capital, £1,000. Electrical engineers and contractors, etc. Directors: R. L. Muir and N. Winn. Regd. office: 162, Millbank, S.W.1.

Cresco Electrical Patents, Ltd.—Registered 26th June. Capital, £100. Permanent directors: A. Jankel, P. Krens and Erick Marcuse. Regd. office: 26/27, Conduit Street, W.1.

Neco Geared Motors, Ltd.—Registered 26th June. Capital, £100. Manufacturers of, and dealers in, electrical and other geared motors and other electrical and mechanical appliances, etc. Mrs. Estere M. Scott, 13, Edwardes Square, W.8, is the first director.

Receiver Appointed

Craft Electrical Industries, Ltd.—E. G. Clegg, York Street, Manchester, was appointed receiver on 9th June under powers contained in debenture dated 5th April, 1946.

Liquidations

A. H. Hunt, Ltd.—Mr. J. A. Hunter, 55, Bendon Valley, Garratt Lane, Wandsworth, London, S.W.18, has been appointed liquidator in place of Mr. R. J. Mack, resigned.

Brightglow, Ltd.—Winding up voluntarily. Liquidator, Mr. B. Phillips, 76, New Cavendish Street, London, W.1, to whom all claims should be sent by 16th August.

Phillips Electrical Supplies, Ltd.—Winding-up voluntarily. Liquidator, Mr. B. P. Evans, 37, Woodfield Avenue, Hyde, Cheshire. Particulars of claims to the liquidator by 3rd August.

Bankruptcies

H. W. Laker, electrical engineer and contractor, carrying on business at 3, The Parade, Station Road, New Milton, Hants, as "New Milton Electrical Engineers," and previously at "Beulah," Manor Road, New Milton, as "H. W. Laker & Co."—Receiving order made 6th July on debtor's petition.

H. Evans, electrical factor, carrying on business at 60, Berners Street, London, W.1.—Order for discharge made 10th June, 1948, subject to his consenting to judgment for £60 being entered against him and to pay £1 10s. costs of judgment (£60 paid in lieu of entering up judgment).

STOCKS AND SHARES

THE political atmosphere at the time of writing is the reverse of favourable to prices of Stock Exchange securities. Prices during the past week have given way; in some cases materially. Where they have not moved, the reason is, generally, that prices have not been tested by business. There is a steady stream of small selling every day, without this being countered, as normally it would be, by purchases. The buyer is a rare and shy bird but, luckily for quotations, a fair-sized bear account exists in many of the markets, and this is of considerable service at the present time in saving the majority of prices from any abrupt fall. Electricity " threes " are now 99⅞; Transport " threes " 96½.

The Week's Price Changes

Falls greatly outnumber the rises which have taken place since a week ago in Stock Exchange markets. Amongst the few improvements gained by securities quoted in our lists, Anglo American Telegraphs stand out with the principal gains. Babcock & Wilcox strengthened to 63s. 9d. and Electric Constructions to 48s. 9d. E. K. Cole and Cossor shares are both a shade harder at 12s. and 8s. respectively. On the other side of the sheet, British Electric Traction deferred is a further 80 points down at 1,575; Cable & Wireless fell 6 to 179¼ for the ordinary and 4 to 120¼, for the preference. Tillings gave way to 95s. 6d., a drop of 7s. Falls of 2s. 6d. lowered Victoria Falls to 7½, Aron to 47s. 6d. and Associated British Engineering to 40s. The Indian utilities are mostly easier. Amongst smaller falls are Crabtree, 41s. 3d., Greenwood & Batley, 52s., International Combustion, 40s., and Reyrolle, 60s. Revo eased off to 58s., C. A. Parsons to £3, Crompton Parkinson to 24s., Associated Electrical Industries to 71s. 3d. In addition to these there are a number of other declines.

Miscellaneous Matters

Anglo American Telegraph stocks were marked up on the report of a favourable Court decision in connection with the dispute with Western Union over the liability to profits tax. The deferred jumped 7 points to 25, and the 6 per cent preferred 11½ points to 125. The latter is still about 10 points below the recent best. In a circular to Victoria Falls stockholders, regarding the coming liquidation, the company repeats an earlier estimate to the effect that ordinary stockholders should receive " not materially less " than the current market value of their holdings. A substantial interim payment is predicted after a meeting to be called towards the end of the year. It is confirmed that the £1 preference will be paid off at par, plus accrued interest: shares are changing hands around 20s. Four years ago the price stood at 35s. 6d., while the ordinary, now 71s. 4d., were then quoted at 90s.

Scophony's Reconstruction

Scophony's proposals for eliminating the capital loss of £248,000 are regarded by the market as commendably thorough. They involve the writing-down of the 5s. shares to 1s., leaving the issued capital at £62,000. With the balance-sheet cleaned up, the second stage will deal with the raising of the necessary fresh capital. Of the £160,000 required, it is intended to offer 1s. shares at par to the extent of £80,000 to shareholders and a further £20,000 to the directors, the balance to be raised by mortgages. Confidence in the proposals is encouraged, apart from the managing director's agreement to underwrite free the whole issue, by the company's progress report: current production is 50 per cent above last year's corresponding level. The shares stand at 1s. 9d. Elsewhere in the radio market E.M.I. shares have gone back to 15s. 6d., the lowest price touched since 1942.

Higher Earnings

Annual figures are available now for the majority of companies which ended their financial years by the first quarter of 1948. As the following table shows, they are fairly consistently—and often substantially—above the previous results. Profits are expressed below as gross earnings per cent on the ordinary capital:—

Ordinary Shares	*Earned Per Cent*		*Last Dividend Per Cent*	*Yield Per Cent*
	1946	1947		
A.E.I	37·6	41·3	15	4·1
Auto. Telephone	18	61·8	12½	3·9
Brush ..	nil	78·5	nil	—
Cossor	32·7	nil	nil	—
Crompton ..	38	39·1	22½	4·5
Enfield ..	10·7	21·2	7½	4·5
Henley's ..	55	87·8	20	4·1
Revo ..	39·1	80	27½	4·6
Reyrolle ..	17·4	18·3	12½	4·1
Walsall ..	137·9	135·5	70	5
A. West ..	20·1	31·6	10	5
Siemens ..	18·3	20·6	7½	4·6
Aron ..	22·5	32·7	15	6
Switchgear & Cowans ..	2·4	31·4	20	5·9

Conservative Dividends

In only the last two of the instances above did increased earnings result in higher dividends. Both had raised their payments before the dividend limitation principle was generally accepted. Stockholders in some of the other companies, such as Henley's, Revo and Automatic Telephone, may have felt cheated, by circumstances, of a better reward. They have, however, the compensation of seeing their dividends defended in depth against the impact of events on company earnings. Not that the trade situation is threatening in that respect, so far as it concerns stockholders in the capital industries as opposed to the less comfortable trade in consumer goods. Factors responsible for the good results of many electrical equipment manufacturers seem likely to be well sustained by the re-equipment and expansion of industry, assisted by supplies under Marshall aid.

MOTORS
GENERATORS

CONTROL GEAR
AIR BREAK
OIL IMMERSED
HAND OPERATED
AUTOMATIC

SWITCHGEAR
SWITCHES
FUSES
SWITCHBOARDS
AIR BREAK
OIL IMMERSED

FANS
CEILING
DESK and
BRACKET
VENTILATING

LIGHTING FITTINGS
suitable for FILAMENT,
GAS-DISCHARGE, and
FLUORESCENT LAMPS

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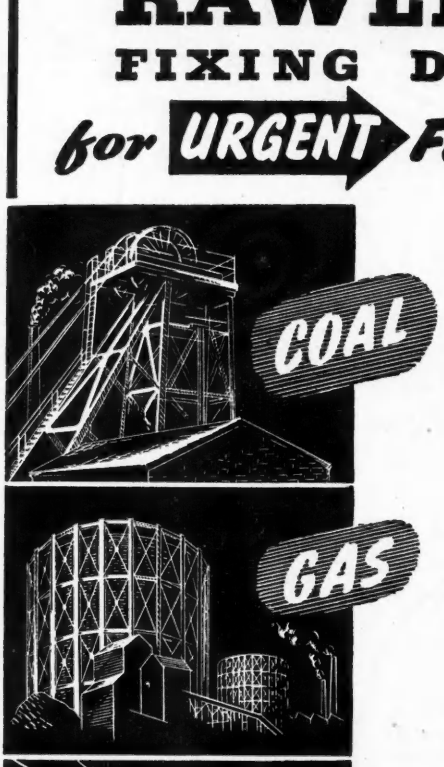

More coal, more gas, more electricity—these are urgent priorities in the production drive. More power means more machinery, plant and equipment . . . and that means thousands of urgent fixing jobs. That is where Rawlplug Fixing Devices play a vital part. For Rawlplug Fixing Devices provide the means of carrying out permanent fixings *quickly*, with the minimum of labour, tools and expense. Whatever the fixing problem, the Rawlplug range of fixing devices provides a perfect answer. The range includes Rawlplugs for fixings with all sizes of screws, Rawlbolts for all bolt fixings, Rawlanchors, toggle bolts, metal plugs and numerous other devices. The advice of our technical experts is freely at your service.

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CROMWELL RD., LONDON, S.W.7

B342

The Transport Act

Effects Upon Electrical Traders

By Graham Saville

MOST electrical concerns will be aware that with the coming into operation of the Transport Act, 1947, various important changes are occurring which will have repercussions upon their own transport arrangements. The first major development from the Act was the transfer of the railways and canal undertakings to the British Transport Commission on 1st January, 1948. The effect of this transfer on the working of traders' own transport arrangements has not yet been felt to any considerable extent. This, however, is only the first step in the new arrangements and it is as well that electrical concerns should be aware at the onset what steps are available for their protection.

To safeguard the rights of the public and traders generally, Consultative Committees are to be set up. These consist of a Central Transport Consultative Committee for Great Britain and a Transport Users' Committee in respect of passenger traffic and in respect of goods traffic, or Transport Users' Committees in respect of both passenger and goods traffic.

Composition of Committees

Each Committee is to consist of an independent chairman; members appointed after consultation with such bodies representative of the interests concerned as the Minister thinks fit, to represent agriculture, commerce, industry, shipping, labour and local authorities; and members appointed from among persons nominated by the Commission.

The Act includes various special provisos with regard to the constitution of these Committees, one being that in the case of the Central Transport Consultative Committee the persons nominated must include at least one member of the British Transport Commission. Another is that should the Minister of Transport feel that it is unnecessary to appoint a member to represent any of the interests mentioned he need not do so.

The terms of reference of these Committees are very wide, as they have to consider and, where they feel it necessary, make recommendations in regard to any matter (including charges) affecting the services and facilities provided by the British Transport Commission, which has been the subject of representations made to the Committee by users.

Each Committee must meet when convened by its chairman and not less than twice a year. The chairman must call a meeting when he is required to do so by any three members and he can convene the Committee whenever he considers it necessary.

Choice of Transport

Electrical concerns should be aware of their right to determine the type of transport they shall use. This right is still retained, but it does not impose on the Commission any obligation to provide or continue to provide any goods transport service between any particular points. The trader's right to select the form of transport does not prevent the Commission from making charges which differ according to the requirements made as respects the kinds of goods transport services which are to be used. The Commission cannot withdraw any facility without giving at least one month's notice of its intention.

Most electrical concerns will now be aware of the new organization of British Railways. There are six regions: London-Midland, Western, Southern, Eastern, North-Eastern, and Scottish, with respective headquarters at Euston, Paddington, Waterloo, Liverpool Street, York and Glasgow. There are various anomalies in this provisional "set-up," and changes may be expected in the near future.

Similarly, the arrangement regarding the functioning of the Docks and Inland Waterways Executive is that four divisions are now in operation, *viz.*, the North-Eastern, North-Western, South-Western and South-Eastern with headquarters at Leeds, Northwich, Gloucester and London. The Northwich headquarters will probably be moved to Liverpool.

Traders should be aware that the Act provides that the Commission shall prepare schemes with regard to the charges made in respect of the facilities which it provides. The time limit laid down for the preparation of such schemes is two years from the passing of the Act, or such longer period as the Minister of Transport may allow. Considera-

tion has to be given to various factors such as alternative sets of terms and conditions, minimum charges and exceptional rates, and schemes have to be submitted to the Transport Tribunal for confirmation. The Commission after submitting a draft of a charges scheme to the Transport Tribunal must publish it in a manner directed by the Tribunal.

Objections to any scheme can be made by (*a*) Any body representative of any class of persons using the services or facilities to which the scheme will relate; or (*b*) Any body constituted for the purposes of any scheme for the carrying on under national ownership or control of any industry or part of an industry or of any undertaking, which uses the services or facilities. There is provision for other objections to be made, but electrical concerns will naturally be mainly interested in the bodies set out in (*a*).

The Transport Tribunal is the new name of the Railway Rates Tribunal, but in addition to carrying out the functions of the Railway Rates Tribunal, the new body has also taken over a considerable part of the jurisdiction previously exercised by the Railway and Canal Commission.

Under the Transport Act long-distance goods road haulage undertakings are to be acquired. While there has not yet been any general take-over, already some firms have been acquired by the British Transport Commission. In addition, large-scale road interests were acquired by the Commission with the railway companies.

The position of "C" licensed vehicles, the operation of which was previously to be restricted under the Act, is now that they are exempted from all restrictions. Electrical concerns should, however, be aware that the Government spokesman in withdrawing the clauses restricting "C" vehicle operation indicated that should the operation of these vehicles be such as to interfere with the work of the Commission, steps would be taken to remedy the position. This can be interpreted as meaning that if there were a large-scale increase in the number of "C" licensed vehicles operated, steps would be taken to restrict their activities.

The points already outlined are some of those which are of importance to electrical concerns, but it is advisable that a careful watch should be kept on the day-by-day progress of the activities of the Commission, as its powers are wide and can have considerable effect on an individual firm's transport arrangements.

Patents in Germany

New Arrangements Instituted

SINCE the beginning of the 1939-45 war, patent relations have been in the doldrums. When the war began in September, 1939, our Patents, etc., Emergency Act came into force and remained so until the end of 1947. Statutory Orders were issued by the Board of Trade to give the Act effect. Germany replied in kind in February, 1940. The aim of each country was to obtain so far as possible the maximum benefit for its own nationals and to hamper those of the other side.

In this country procedure as regards German patents, granted and pending, could to some extent be proceeded with, provided there was the necessary money in this country. Then that was reduced to the payment of renewal fees by non-enemies, who were licensed or had an interest in the patent.

A large number of patent applications of German origin were thrown open to the public at the end of the war and a list of these has been published. Except where non-enemy parties who wanted licences were concerned, pending German-owned British applications were only taken to allowance.

The Comptroller was empowered to grant licences to interested parties under German-owned British patents, on terms which he arranged, the royalties being payable to the Custodian of Enemy Property.

Now at last the Board of Trade has issued Statutory Instruments 1948 Nos. 725, 726, 727. The first of these permits trading in German patents, the second permits transfers and assignments of these, and the third releases financial funds and property in connection therewith which have been under the control of the Custodian of Enemy Property and the Board of Trade. The Orders are applicable to any Government, public or other authority in Germany, to any individual resident in Germany, and to any individual or corporate or incorporate body of persons carrying on any business in Germany.

The Germany covered by the Orders includes Berlin, the French, British, American and Russian military zones in Germany as established by the various occupying powers on 5th June, 1945, and the part of the former German Reich now administered by the U.S.S.R.

Patent applications coming from Germany can therefore now be filed at the British Patent Office. In Germany, however, the difficulty is that there is no Patent Office at present. It is understood that steps are being taken to try to remedy this.—"PAGENT."

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1940

METROPOLITAN-VICKERS Electrical Co., Ltd., and A. Mandl.—"Electric rectifier systems used in power or control systems such as follow-up systems." 12738. 8th August, 1940. (604185.)

Metropolitan-Vickers Electrical Co., Ltd., and A. Tustin.—"Servo-operated position adjusting systems." 14551. 25th September, 1940. (Cognate application 16099/40.) (604186.)

1941

Dansk Industri Syndikat, Compagnie Madsen Aktieselskabet.—"Thermionic valve circuits for generating modulated pulse trains." 10100. 21st June, 1940. (604107.)

1943

British Thomson-Houston Co., Ltd.—"Electromagnetic switches." 17237. 24th October, 1942. (604272.)

General Electric Co., Ltd., and D. O. Hawes.—"Radiolocation apparatus." 19412. 19th November, 1943. (604273.)

Standard Telephones & Cables, Ltd.—"Electric pulse generating system." 20395. 5th December, 1942. (604427.)

1944

General Electric Co., Ltd., and R. W. W. Sanderson.—"Inert dry batteries." 5001. 17th March, 1944. (Cognate application 17291/44.) (604428.)

D. Sciaky.—"Art of electric resistance welding, forging and heating." 9549. 4th August, 1943. (604276.)

Marconi's Wireless Telegraph Co., Ltd.—"Systems for communicating intelligence by means of pulses modulated in width." 10252. 29th May, 1943. (604352.)

H. Hughes & Son, Ltd., D. O. Sproule and A. J. Hughes.—"Systems operating by means of wave trains." 11108. 9th June, 1944. (604429.)

Telefonaktiebolaget L. M. Ericsson.—"Electromagnetic motors." 13044. 9th July, 1943. (604112.)

Metropolitan-Vickers Electrical Co., Ltd., and D. M. Smith.—"Regenerative gas turbine plants." 14151. 24th July, 1944. (604114.)

Oldham & Son, Ltd., and A. O. Roberts.—"Accumulator lamps and charging racks or boards therefor." 18307. 25th September, 1944. (604192.)

Bendix Aviation Corporation.—"Regulating means for electrical generators." 18506. 10th August, 1943. (604123.)

Western Electric Co., Inc.—"Electrical pulsing devices." 25951. 28th December, 1943. (604434.)

1945

Standard Telephones & Cables, Ltd., P. K. Chatterjea and L. W. Houghton.—"Electric pulse communication systems." 308. 3rd January, 1945. (604130.)

Marconi's Wireless Telegraph Co., Ltd.—"Pulse communication system." 2742. 16th September, 1943. (604438.)

Pye, Ltd., and B. J. Edwards.—"Means for reproducing X-ray images." 4731. 26th February, 1945. (604198.)

Submarine Signal Co.—"Electro-acoustic transducer." 4824. 19th December, 1939. (604358.)

Okonite-Callender Cable Co., Inc.—"Buoyant electric cables." 5189. 6th February, 1943. (Divided out of 588819.) (604137.)

Reeves & Co. (Birmingham), Ltd., and W. S. Mansell.—"Earthed electric lampholders." 5380. 3rd March, 1945. (604288.)

E. G. Budd Manufacturing Co.—"Electric resistance welding systems." 7837. 31st March, 1944. (604442.)

British Broadcasting Corporation and F. A. Peachey.—"Generation of sound by electro-mechanical means." 7888. 28th March, 1945. (604142.)

Oldham & Son, Ltd., and A. O. Roberts.—"Emergency electric lamps. 13345. 28th May, 1945. (604210.)

A. H. Stevens (Electronic Laboratories, Inc.).—"Voltage modifying systems." 15689. 20th June, 1945. (604296.)

Sperry Gyroscope Co., Inc.—"Electric orienting, electric aiming and fire control systems and apparatus therefor." 16213. 23rd June, 1944. (604213.)

Waygood-Otis, Ltd.—"Electric control system for elevators." 16214. 24th June, 1944. (604455.)

A. H. Stevens (Ray-O-Vac Co.).—"Electric dry cells or batteries." 18738. 21st July, 1945. (604458.)

G. Longo.—"Apparatus for producing angular-velocity modulation in a cathode-ray beam." 19912. 8th March, 1945. (604303.)

Fairey Aviation Co., Ltd., and A. G. Forsyth.—"Electrical equipment on aircraft." 21354. 21st August, 1945. (604225.)

Stromberg-Carlson Co.—"Switches." 21444. 21st April, 1945. (604459.)

Philips Lamps, Ltd.—"Connection of an electrical supply conductor to electric apparatus, more particularly a blocking-layer rectifier." 21464. 11th June, 1940. (604460.)

Standard Telephones & Cables, Ltd.—"Electron-discharge apparatus." 22514. 11th September, 1944. (604309.) "Electrical terminal connector blocks." 23771. 23rd September, 1944. (604310.) "Method of electro-forming dry rectifier elements." 35065. 27th January, 1945. (604500.)

Compagnie Générale d'Electricité.—"Contact device for electrical apparatus." 23751. 5th February, 1941. (604228.)

W. S. Percival.—"Electron-discharge valve amplifiers." 24588. 22nd September, 1945. (604152.)

C. Nestle & Co., Ltd., S. F. Warren and S. C. Pritchard.—"Hair drying machines." 24926. 26th September, 1945. (604311.)

Sangamo Weston, Ltd.—"Electrical measuring or control systems and apparatus." 25475. 14th October, 1944. (604312.)

C. E. Every (Titanium Alloy Manufacturing Co.).—"Dielectric compositions." 25866. 4th October, 1945. (604229.)

P. Buisson.—"Apparatus for accurate measurement of displacement by variation of electrical capacity." 26194. 7th October, 1944. (604382.)

F. M. Wright.—"Terminating resistor for coaxial transmission lines." 26643. 11th October, 1945. (604470.)

Metropolitan-Vickers Electrical Co., Ltd., Whitehead Iron & Steel Co., Ltd., T. W. Barton and H. Ferry.—"Electric motor control systems for cranes, hoists and the like." 27191. 17th October, 1945. (604317.)

Jack & Heintz, Inc.—"Electronic sequence timers." 27504. 6th November, 1944. (604390.)

Philco Corporation.—"Magnetron oscillators." 27529. 28th October, 1944. (604471.)

R. G. Garfitt.—"Ultra-high-frequency electrical apparatus." 27745. 22nd October, 1945. (604231.)

Eureka Vacuum Cleaner Co.—"Suction cleaners." 28300. 24th February, 1945. (604236.)

Standard Telephones & Cables, Ltd. (Federal Telephone & Radio Corporation).—"Pulse amplitude selective system." 28425. 26th October, 1945. (Convention date not granted.) (604393.)

English Electric Co., Ltd., and G. R. Wilson.—"Electric motor control systems." 28521. 29th October, 1945. (604473.)

Sulzer Frères Soc. Anon.—"Gas turbine plants." 28776/7. 5th May, 1945. (604155/6.)

Operadio Manufacturing Co.—"Acoustic transducers." 28857. 3rd November, 1944. (604159.)

British Thomson-Houston Co., Ltd.—"Electric lighting systems for tubular lamps and holders for use therein." 28860. 7th November, 1944. (604237.)

Standard Telephones & Cables, Ltd., and P. Welch.—"Electron-discharge devices." 28902. 31st October, 1945. (604321.)

Marconi's Wireless Telegraph Co., Ltd.—"Production of electrolytic recording solutions." 29181. 4th November, 1944. (604162.)

Ferranti, Ltd., M. K. Taylor and F. C. Williams.—"Thermionic valve systems." 29287. 5th November, 1945. (604239.)

Westinghouse Electric International Co.—"Electron-discharge devices." 29963. 20th November, 1944. (604240.) "Apparatus for supplying electric current to a load, for example a welding load." 33912. 19th August, 1944. (604258.)

I. Bowen, C. S. Hudson and C. W. Cooper.—"Apparatus for locally reducing or eliminating disturbing magnetic fields." 30100. 10th November, 1945. (604329.)

Naamlooze Vennootschap Fabriek van Electrische Apparaten Voorheen F. Hazemeijer & Co.—"Enclosed electric switchgear." 30736/7. 30th January, 1943. (604331 and 604399.)

Patelhold Patentverwertungs- & Elecktro-Holding, Akt.-Ges.—"Electron-tube for ultra-short electromagnetic oscillations." 30769. 17th November, 1944. (604400.)

Compagnie Générale d'Electricité.—"Method of charging batteries of electric accumulators." 31055. 28th March, 1944. (604402.)

Standard Telephones & Cables, Ltd., and W. E. Laycock.—"Manufacture of magnetic bodies from compressed powdered materials." 31652/3. 23rd November, 1945. (604169/70.)

Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—"Apparatus for stereophonically recording, transmitting and reproducing sound." 31757. 24th July, 1940. (604244.) "Electric insulators." 31760 20th July, 1940. (604245.)

Philips Lamps, Ltd.—"Frequency-doubling devices for high-frequency oscillations." 31762. 15th August, 1940. (604246.) "Circuits including two oscillators or amplifiers comprising discharge tubes and a load, the oscillator or amplifier from which the load is normally supplied being replaced by the other in the event of a disburbance." 31763. 20th July, 1940. (604247.) "Seals between metal and glass members." 31764. 17th August, 1940. (604248.) "Cathode-ray tube device for generating ultra-high-frequency oscillations." 31766. 11th July, 1940. (604249.)

Sadir-Carpentier.—"Radio navigating systems." 32179. 21st October, 1943. (604493.)

G. A. L. Soc. Anon. des Appareils.—"Tubular elements for electric heating." 32445. 24th December, 1942. (Cognate application 32446/45.) (604405.)

F. Heaton and A. R. Heaton.—"Safety means for use with electrical apparatus." 32498. 1st December, 1945. (604172.)

Philips Lamps Ltd.—"Radio receiving installations." 31st July, 1940. (604255.)

Bendix Aviation Corporation.—"Electrical spark producing apparatus." 33472. 11th December, 1944. (604339.)

R. C. Robbins and T. P. Hvinden.—"H.F. energy detectors." 33973. 14th December, 1945. (604496.)

W. L. Maxson Corporation.—"Electric ovens." 34281. 22nd January, 1945. (Cognate application 34282/45.) (604497.)

S. A. Byard and C. S. Wright.—"Electronic amplifiers." 34753. 21st December, 1945. (604499.)

1946

Standard Telephones & Cables, Ltd.—"Electric pulse amplitude discriminator circuit." 916. 15th May, 1943. (604413.)

Philips Lamps, Ltd.—"Electric rectifying circuits employing indirectly heated tubes." 22918. 14th February, 1940. (604180.)

1947

Westinghouse Electric International Co.—"Torque indicating or measuring devices" and "Apparatus for indicating or measuring the thrust of a shaft." 21572/3. 15th September, 1942. (604182/3.)

Amended Specification

Telegraph Condenser Co., Ltd., and anr.—"Electrical condenser assembly." (526413.)

Trade Marks

APPLICATION has been made for the registration of the following trade marks. Objections may be entered within a month from 14th July:—

ULTRA. No. 655,968, Class 7. Electric motors (other than electric motors for land vehicles); electric mechanisms for operating, by remote or correspondence control, the controls of industrial machinery engines, motors, aircraft and of steering gear for vehicles; speed governors for machines; electric generators, alternators; and parts included in Class 7 of all the aforesaid goods.—Ultra Electric, Ltd., Ultra Works, Western Avenue, Acton, London, W.3.

DESIGN. No. B648,066, Class 9. Measuring, indicating, recording, scientific, etc., apparatus, instruments and devices; and calculating machines, and parts included in Class 9 of all such goods.—Optikotechna, Společnost S.R.O. Přerov, Dvorakova ulice, Přerov, Czechoslovakia.—Address for service: c/o Reddie & Grose, 6, Bream's Buildings, London, E.C.4.

WINDMILL (designs). Nos. 655,601-2, Class 9. Measuring and weighing apparatus and instruments.—Payne & Griffiths, Ltd., Tudor Works, Windmill Lane, Smethwick.

AUTOSTAT. No. 658,123, Class 9. Thermostats.—Auto Precision, Ltd., Commerce Way, Purley Way, Croydon.

DRAKA (design). No. 659,332, Class 9. Insulated electric wire and cables.—Naamlooze Vennootschap Hollandsche Draad-en Kabelfabriek, Hamerstraat 10, Amsterdam. Address for service: c/o J. E. Evans-Jackson & Co., 49, Albert Hall Mansions, Kensington Gore, London, S.W.7.

AMPLIVOX. No. 659,026, Class 10. Electro-medical acoustic apparatus, hearing aids, medical instruments and apparatus for detecting and estimating the degree of deafness, and parts included in Class 10 of all such goods.—Amplivox, Ltd., 2, Bentinck Street, Manchester Square, London, W.1.

SURRAN. No. 540,767, Class 11. Electrical apparatus for lighting, heating, steam generating, cooking, refrigerating, drying, ventilating, water supply, etc.—S. A. Singleton and Ethel I. Singleton, trading as Singleton Bros., Oreston Lane, Effingham, Surrey.

AUTOASTER. No. B658,443, Class 11. Bread toasting appliances.—Permoid, Ltd., 56-58, Clerkenwell Road, London, E.C.1.

Design incorporating the company's name. No. 659,588, Class 11. Refrigerating apparatus, and parts thereof included in Class 11.—Refrigeration A-Z (Guildford), Ltd., 4, Mill Lane, Guildford.

PETRONIC. No. 660,254, Class 11. All goods included in Class 11.—Petrinovic & Co., Ltd., 25-31, Moorgate, London, E.C.2.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Aireborough.—24th August. Urban District Council. Two rectifier sets. (See this issue.)

Argentina.—5th August. Obras Sanitarias de la Nación, Charcas 1840, Buenos Aires. Two electrically driven deep-well pumps, four l.v. switchboards and three outdoor type oil-immersed three-phase transformers.

10th August. Dirección de Agua y Energia Electrica, Lavalle 1556, Buenos Aires. Bare copper conductors, underground armoured cable, fuses, relays and lightning conductors. 14th December. Supply and erection of electro-mechanical installations in the Alvarez Candarco hydro-electric power station and substation, Province of Mendoza.

Australia.—QUEENSLAND.—27th August. Brisbane City Council. Fifty outdoor distribution transformers, ranging from 200 to 1,000 kVA. (Ref. 37275/48.)*

Belfast.—6th August. Electricity Department. Grit arresting plant. (16th July.)

Canada.—TORONTO.—3rd August. Hydro-Electric Power Commission of Ontario. Two steam generating units, etc., for two 60,000-kW steam turbo-generators at Windsor generating station. (Ref. 30188/48.)*

Ceylon.—COLOMBO.—11th September. Department of Fisheries. One or more new or second-hand block ice-making plants. (Ref. 37582/48.)*

Goole.—3rd August. Town Council. Electrical work for houses (30) and flats (12) on the Moorfield site. Particulars from borough engineer, Municipal Offices.

Iran. — TEHERAN. — 4th August. Iranian Tobacco Monopoly. Various engineering tools, electrical sundries, etc. Conditions and specifications can be obtained from the Chancery of the Iranian Embassy, 50, Kensington Court, London, W.8.

Luton.—7th August. Town Council. Electrical installations in shops and flats, Leagrave Housing Estate. Particulars from the borough engineer, Town Hall.

Luxembourg.—Telegraph and Telephone Department. Supply of telegraph and telephone materials. Division Technique, 17, Rue de Hollerich, Luxembourg.

Manchester.—27th August. Education Committee. Electrical installation at Crossacres Primary School. (See this issue.)

Newcastle-on-Tyne.—Transport Department. 600-kV mercury-arc rectifier equipment.—Particulars from the general manager.

New Zealand.—WELLINGTON.—State Hydro-Electric Department. Outdoor switchgear and steelwork for Upper Hutt substation (closing date 21st September); 11-kV seven-panel control board for Khandallah substation (closing date 28th September); and 250-MVA, 11-kV switchgear for Haywards substation (closing date 5th October). (E.P.D. Ref. 38059/48.)*

27th August. Post and Telegraph Department (Stores Division), G.P.O., Wellington. Paper-insulated, lead-covered telephone cable. (E.P.D. 38058/48.)*

North Riding.—7th August. County Council. Electric refrigerators (a.c.). (See this issue.)

North Western Area.—4th August. Electricity Board, No. 1 Sub-Area. Electrical installation at the Royal Technical College (Practical Building Department), Salford. (See this issue.)

Pembroke.—10th August. Town Council. Electric sewage pumping sets for Kingswood sewerage scheme. Particulars from the borough engineer, Municipal Offices, Pembroke Dock.

Portuguese East Africa.—Portuguese Directorate-General of Colonial Development. Date extended for tenders for two alternators, two boilers, switchgear, etc., for new power station at Lourenço Marques.*

Siam.—BANGKOK.—6th September. Railway Department. One d.c. and one a.c. welding plants. (Ref. 37632/48.)*

South Africa.—19th August. Department of Posts and Telegraphs, Pretoria. Paper sleeves for conductor cable. (E.P.D. 38252/48.)*

JOHANNESBURG.—6th January. South African Railways and Harbours (Stores Dept.). 105 2-kW train lighting dynamos and control gear; and 1,540 Monobloc 150-Ah lead-acid 4-cell units. (Ref. 43950/47.)*

Sutton and Cheam.—30th July. Corporation. Electrical installation in 21 flats, Clensham Lane housing site, Sutton. (9th July.)

Uruguay.—11th August. Usinas Electricas y Telefonos del Estado. 4,400 telephone instruments. (Ref. E.P.D. 38008/48.)*

* Specifications may be inspected at the Export Promotion Department, Thames House North, Millbank, S.W.1.

Orders Placed

Australia.—N.S.W. Department of Railways. 33-kV switchgear and spare parts for White Bay power station (£112,203).—English Electric Co. Switchgear (£44,692).—British General Electric.

Newcastle-on-Tyne.—City Council. Accepted. Thirty-six 140-W sodium street lighting lanterns for Whickham View (£443).—General Electric Co. Specialized overhead line equipment for the maintenance of the transport undertaking (£878).—B.I. Callender's Cables.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alconbury.—Additions, Alconbury House, for farm institute (£30,000); county architect, Walden House, Huntingdon.

Boldon.—Houses (44), Boldon Colliery; Gordon Durham & Co., builders, East Boldon.

Bradford.—Abattoir, Knowles Lane, Tong; city architect.

Houses (48), Eccleshill and Clayton Estate; Mosleys (Public Works), Ltd., builders, 112, Pullans Avenue, Eccleshill.

Camborne.—Extensions, Technical College, Trevenson (£65,000); county architect, Truro.

Cardiff.—Houses (124); British Steel Constructions, Ltd., Smith Road, Wednesbury.

Enfield.—Primary school, Salisbury Road (£137,723); county architect, Middlesex House, Vauxhall Bridge Road, S.W.1.

Fifeshire.—Miners' houses (600); county architect, Cupar.

Folkestone.—Primary school, Mundella, for Kent E.C.; Willan & Stewart, architects, 127, Sandgate Road.

Golborne. — Spinning mill (£52,709), for Harbens, Ltd.; G. Moss & Sons, Ltd., builders, Pennington Sawmills, Leigh, Lancs.

Ilkeston. — Houses (350), Kirk Hallam; borough engineer.

Lewisham.—Cinema, Lewis Grove, for Associated British Picture Corporation, Ltd.; W. R. Glen, architect, Colquhoun House, Broadwick Street, W.1.

London.—SHOREDITCH.—Flats (92 dwellings), Colville Estate, Felton Street; borough architect, Shoreditch Town Hall, E.C.1.

Malvern. — Houses (70), Langlands site; U.D.C. surveyor.

Manchester.—Extensions, Babies' Hospital, Brooke House, Levenshulme, for Duchess of York Babies' Hospital Committee; W. Thorpe & Son, Ltd., builders, Chester Road, Cornbrook.

Factory extensions, Vauxhall Street, for T. Tabberner & Co., Ltd.; G. Bullimore, architect, 208, Bramhall Lane, Davenport.

Flats (282), Newall Green, and aged persons' flats (42), Baguley Hall; city architect.

Mansfield.—Houses (84), Bancroft Lane Estate; borough engineer.

Middlesbrough.—Hotel (£60,000) for J. W. Cameron & Co., Ltd., Lion Brewery, West Hartlepool; Kitching & Co., architects, 21, Albert Road.

Middleton.—Extensions, Rhodes Chemical Works, for Geigy Co., Ltd.; B. Waterhouse, architect, 134, Deansgate, Manchester, 3.

Orrell.—Houses (56), Moor Road; U.D.C. surveyor.

Paisley.—Maternity hospital and nurses' home; Sir John Burnet, Tait & Lorne, architects, 44, Charlotte Square, Edinburgh.

Preston.—Eight schools (£260,000); county architect, Fishergate Hill.

Rauceby (Sleaford). — Reinstatement and equipment of the Hospital (£50,830); clerk and steward to the Hospital, Grantham Road, Sleaford.

St. Albans.—School, Watson Avenue (£66,500); county architect, Castle Street, Hertford.

Salford.—Flats (64), Regent Road; city engineer.

Scunthorpe.—Cinema, dance hall and café, Exeter Road and Doncaster Road; J. L. Campbell, 58, Cliff Gardens.

Sheffield.—Houses (56), Parson Cross Estate (£75,323); Parkin (Rotherham), Ltd., builders, Bawtry Road, Rotherham.

College of technology, Division Street (£1,000,000); city architect.

Factory ; Lawrence Wilson & Sons, Ltd., cutlery manufacturers, 43, Rockingham Street.

Houses (240); city architect.

Engineering works and offices, Carlisle Street and Dorking Street; Morgan Fairest, Ltd., 44/62, Scorby Street.

South Shields.—Houses (38); R. Brown & Sons, Ltd., 24, Lord Street.

Stockton-on-Tees.—Houses (50), Newham Grange and Green's Lane Estates; borough architect, 124, High Street.

Stourbridge.—Houses and bungalows (62), Norton Estate (£76,963); N. Hyde, builder, Sedgley, near Dudley.

Sunderland.—Houses (100) for R.D.C.

Surbiton.—Factory, Cox Lane and Davis Road; Endura (England), Ltd., 51, Portland Road, Kingston-on-Thames.

Swansea.—Houses (210), Penlan Estate; borough architect.

Rebuilding two wards at the General and Eye Hospital (£17,632); Rogers & Davies, contractors, Humphrey Street.

Urmston.—County college, Woodsend Estate, for Lancashire E.C.; G. Noel Hill, county architect, County Offices, Preston.

Uxbridge.—Dwellings (74), Nine Elms, Cowley Peachey; H. E. G. Stripp, surveyor, 263, High Street.

Wakefield.—Houses (112), Eastmoor and Flanshaw Estates; city surveyor.

West Ham.—School, Stratford Road area (£42,000); borough engineer, Town Hall, E.15.

Wigan.—Secondary modern school at Newtown; Rev. H. Shee, St. Joseph's Presbytery, Caroline Street.

York.—Catholic Church, Muncaster Estate; Canon C. F. Farrar, St. Wilfrid's Rectory, Petergate House.

Houses (110), Askham Lane, for T.C.; city engineer and architect.